Senate Graduate Council

Open Session

October 23, 2025

10:00 a.m. - 11:30 a.m.

Needles Hall

NH 3318

Waterloo Campus

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UNIVERSITY OF WATERLOO | Senate

2025 10 23 Senate Graduate Council Meeting Book

AGENDA

	Governance Resources		
	Link to Governance Resources		
	1. Conflict of Interest		
	1.1. Conflict of Interest - Excerpt from Senate Bylaw 1		3
10:00 a.m.	Consent Agenda		
	2. Approval of the Minutes		
	2.1. Minutes of September 17, 2025 Meeting	Decision	4
	3. Graduate Studies Academic Calendar (GSAC) Updates		
	3.1. GSAC Updates	Decision	6
	4. Graduate Awards and Scholarships		
	4.1. Awards and Scholarships for Approval	Decision	30
	5. Curricular Submissions		
	5.1. Faculty of Engineering	Decision	32
	5.2. Faculty of Environment	Decision	69
	5.3. Faculty of Science	Decision	72
	Regular Agenda		
10:05 a.m.	6. Business Arising from the Minutes	Information	
10:10 a.m.	7. Chair's Remarks [Wan]	Information	
10:15 a.m.	8. Curricular Submissions		
	8.1. Faculty of Engineering	Decision	79
10:30 a.m.	9. Graduate Student Funding [Wan]	Discussion	
11:00 a.m.	10. Other Business		
	11. Adjournment The next meeting of the Senate Graduate Council will be on November 17, 2025.		

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 COUNCIL
Minutes of the September 17, 2025 Meeting

Present: Mike Beazely, Steven Bednarski, David Clausi, Charmaine Dean, Rob de Loë, Alison Hitchens, Brian Ingalls, Brian Laird, Christiane Lemieux, Tony Ly [Secretary], Lilhac Medina, Tizazu Mekonnen, Carter Neal, Christopher Nielsen, Brad Pomeroy, Ian Rowlands, Meray Sadek, Justin Wan [Chair]

Resources/Guests: Ashley Day, Carrie MacKinnon Molson, Marianne Simm

Absent: Helen Chen, Tom Duever, Vivek Goel, Abhishesh Homagain, Nicholas Pelligrino, Clarence Woudsma

Organization of Meeting: Justin Wan took the chair and Tony Ly acted as secretary. The secretary advised that quorum was present. The agenda was approved without a formal motion.

1. 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. Beazeley and Hitchens. Carried.

2. Graduate Awards and Scholarships
Council approved all new awards and scholarships as presented.

REGULAR AGENDA

3. Chair's Remarks
The Chair welcomed members to the first Senate Graduate Council meeting after the restructuring of the Senate Graduate and Research Council.

4. Introduction and Orientation
Roundtable introductions were made. The Chair provided an overview of the scope and mandate of the Senate Graduate Council, as well as the role of each member. The Terms of Reference for the Senate Graduate Council was reviewed. It was noted that a priority of this new council was to include broader representation, which includes senior staff, regular faculty members, postdoctoral scholar, and graduate students. Additional meetings were scheduled for time sensitive items that might come forward to the Senate Graduate Council in 2025/26. There is a joint meeting with the Senate Research and Innovation Council on January 13, 2026.

5. Items Proposed for 2025/26
Members discussed and shared ideas for potential upcoming items at the Senate Graduate Council meetings in 2025/26. Members requested the following items brought forward at future meetings: graduate funding and student financial support (a comparison between faculties and external institutions); strategic priorities for graduate education and studies at the university; institutional plans for recruiting and supporting international students; development of new graduate programs and the approval process (market trends and developing effective business cases); graduate student experience and survey results; relationship between supervisors and graduate students; guidance on new technology and artificial intelligence (AI); and the implication and impact of the TA/RA unionization.

6. Updates on TA/RA Unionization
The Chair provided an overview and updates on the TA/RA unionization. The university has a separate bargaining team that is working on this new agreement, and they are currently in the stages of negotiation. The importance of maintaining relationships between TA/RA and their supervisors was emphasized. It was noted that the process of hiring TA/RA could change.

7. Appointment/Election of AQuE Members
The Chair provided an overview of the Academic Quality Enhancement Committee and asked two members of the Senate Graduate Council to participate on this committee. Members discussed the importance of having representation from different faculties on the Academic Quality Enhancement Committee. Ingalls and Laird were selected as the Senate Graduate Council representatives on the Academic Quality Enhancement Committee.

8. Other Business
No other items of business were identified.

9. Adjournment
With no further business, the meeting was adjourned. The next meeting will be held on October 23, 2025 from 10:00 a.m. – 11:30 a.m. in NH 3318.

Memo

DATE: October 14, 2025

TO: Tony Ly, Governance Officer

FROM: Justin Wan, Interim Associate Vice-President, Graduate Studies and Postdoctoral Affairs (GSPA)
Marianne Simm, Director, GSPA

RE: Graduate Studies Academic Calendar (GSAC) updates

Consent agenda items for approval:

1) Section 7.1 Graduate students' supervisors and committees
2) Section 7.4.5 Minimum requirements for PhD degree: Thesis examination
3) Section 13.3 Residence requirements

Items for information:

4) Section 3.10 English language proficiency
5) Section 9.3 Graduate research fields

1) Graduate students' supervisors and committees

Description and rationale for proposed changes:

Updates to the Graduate students' supervisors and committees regulations section are being made to provide additional clarity and to more closely reflect what is happening in practice, versus introducing new or changed regulations.

Proposed effective date: Term: Winter Year: 2026

Current **Graduate Studies Academic Calendar (GSAC)** page:
https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/policy/r1-w8VP0a

7.1 Graduate students' supervisors and committees

The University of Waterloo strongly encourages regular and productive engagements between graduate students, their supervisors and committees that are purposefully constituted to promote students' attainment of their goals. The University recognizes the value of diverse areas of scholarship and lived experiences of those who support graduate students' research. This section of the Calendar defines and provides the regulatory frameworks for graduate student research committees.

The University defines the following roles in support of graduate students:

A **Supervisor** is the primary point of contact for a graduate student. The supervisor meets or exceeds the expectations articulated in the roles and responsibilities of supervisors typically a combination of academic, administrative, funding, and personal supports for the graduate student.

A **Co-supervisor**, when appropriate, may share the responsibilities of the supervisor. Co-supervisory arrangements are desirable when the co-supervisors have complementary knowledge, skills, academic training, professional networks, or other attributes that benefit the student. Co-supervisory relationships may also provide more timely administrative support for graduate students. No more than three supervisors total ~~two co-supervisors~~ are permitted.

~~Normally,~~ The supervisor's or one of the co-supervisor's faculty appointments (including both joint and cross-appointments) will be in the academic unit administering the student's program.

An **Advisory Committee** is formed to provide academic, professional and personal support to graduate students and their supervisors. Because of the broad mandate of the advisory committee, membership may be purposefully large, including members internal and external to the University with disparate training and experience, provided that a proposed member can contribute meaningfully to the student's academic endeavors.

The advisory committee (as a whole or select members) may also play roles in evaluating a graduate student's academic progress related to their research.

An **Examining Committee** evaluates a graduate student's performance on major academic milestones which, at the PhD level, may include comprehensive or qualifying examinations, research proposals, and thesis defenses.

Refer to 7.4.3 Minimum requirements for PhD degree: Comprehensive examination, and 7.4.4 Minimum requirements for PhD degree: Qualifying examination, for the composition of these examining committees.
Refer to 7.4.5 Minimum requirements for PhD degree: Thesis examination for additional information on the composition of examining committees.

At the Master's level, an examining committee may be constituted, typically to evaluate a student's proposal or thesis. Refer to 7.3 Minimum requirements for Master's degree for information on evaluations at the Master's level.

In many instances, there will be common membership between a student's advisory committee and the student's examining committee, though examining committees are typically composed of those with academic credentials that are equivalent to the student's degree program.

Summary of Supervisory Roles, Advisory and Thesis Examining Committee Membership [6]

Role	Tenure Stream faculty			Teaching Stream faculty		External member with adjunct faculty status [4]	Research Professor	Postdoctoral Scholar
	With SSPS2	With SSPS1	Without SSPS	With SSPS1 [5]	Without SSPS1			
PhD sole supervisor	Yes	No	No	No	No	No	No	No
PhD co-supervisor	Yes	Yes [1]	Yes [1]	Yes [1][2]	Yes [1][2]	Yes [1][2]	Yes [1][2]	No
Master's sole supervisor	Yes	Yes	Yes [2]	Yes	No	No	No	No
Master's co-supervisor	Yes	Yes	Yes [2]	Yes	Yes [3]	Yes [3]	Yes [3]	Yes [3]
PhD and Masters Advisory Committee	Yes	Yes	Yes	Yes	Yes	Yes ~~(adjunct status recommended)~~ [9]	Yes	Yes
PhD Thesis Examining Committee [7]	Yes	Yes	Yes	Yes	Yes	Yes [2] [8]	Yes	Yes

[1] with Co-supervisor with SSPS2
[2] with Associate Dean (Graduate Studies) approval
[3] with Graduate Officer approval

[4] including retired faculty members with ~~who maintain~~ adjunct status
[5] Teaching Stream faculty who can demonstrate an active research program and knowledge of the University's administrative structures associated with graduate studies, may apply for SSPS1 following the process outlined for Tenure Stream faculty seeking SSPS2
[6] non-conforming, existing privileges held by faculty members prior to the adoption of these regulations will be retained, as appropriate
[7] Refer to 7.4.5 Minimum requirements for PhD degree: Thesis examination for additional information on the structure of examining committees
[8] Refer to 7.4.5 Minimum requirements for PhD degree: Thesis examination for specific information regarding Adjunct faculty on Examining Committees
[9] Adjunct status is recommended but not required for Advisory Committee membership
Note: additional information on sole-supervisory privilege status (SSPS) is available in section 7.2 of the Calendar.

All faculty appointments referenced in the above table are between the University of Waterloo and the faculty member. In unique circumstances, the Associate Dean Graduate Studies in the Student's home Faculty may recommend to the Associate Vice President Graduate Studies and Postdoctoral Affairs (AVP-GSPA) a supervisory or advisory relationship that differs from the regulations presented here. The AVP-GSPA shall make the decision to approve or reject the proposed relationship.

The following section provides the regulatory framework for graduate supervision at Waterloo.

PhD Supervisors

In order to sole-supervise PhD students, the proposed supervisor must be a tenure stream member of the University faculty with sole-supervisory privilege status (SSPS2).

When a proposed supervisor does not have SSPS2 they may co-supervise with a colleague who satisfies the requirements for sole-supervision as identified under the PhD co-supervisor role.

Similarly, colleagues external to the University of Waterloo who hold adjunct positions at the University may, at the discretion of the Associate Dean Graduate Studies in the student's home Faculty, co-supervise with a colleague who satisfies the requirements for sole-supervision when:

- The adjunct holds a PhD in a related discipline; and
- The adjunct remains active in research.

Research professors and teaching stream faculty are permitted to serve as co-supervisors for PhD students. Postdoctoral scholars may not serve as supervisors or co-supervisors for PhD students.

A faculty member who is sole-supervising PhD students at the time of their retirement may continue to sole-supervise those students to completion. Following their retirement, faculty members may not begin sole-supervising new students.

Masters Supervisors

Any tenure stream faculty member who holds SSPS1 or SSPS2 at the University of Waterloo may sole-supervise research master's students. Faculty members without SSPS1 may only sole-supervise research Master's students with approval from the Associate Dean, Graduate Studies, in the student's home Faculty.

Teaching stream faculty who wish to sole-supervise Master's students may seek SSPS1. Teaching stream faculty seeking SSPS1 will follow the process outlined for tenure stream faculty pursuing SSPS2. To qualify, teaching stream faculty shall demonstrate an active research program and knowledge of the University's administrative structures associated with graduate studies.

Co-supervision by other members of the University community (e.g., postdocs, research associate professors, adjunct faculty) is permitted at the discretion of the Graduate Officer in the student's home unit when:

- the co-supervision adds value to the student's learning outcomes (e.g., research or professional development) and
- for internal members of the University, the role of co-supervisor is permitted by the terms of the proposed co-supervisor's appointment.

Advisory Committee

Purpose and functions

A student's advisory committee acts as a partner with the student and the supervisor(s) in guiding and advising the student on research and assisting supervisor(s) in their monitoring functions. Advisory committee members provide the student with expert guidance or advice in specific areas of the student's research work; for the supervisor(s), advisory committee members provide critical and constructive feedback on the student's research. Procedures for appointing and confirming advisory committees will vary between Faculties.

Collectively, advisory committees are intended to be sources of support to supervisors and students in promoting the resolution of issues and promoting positive academic outcomes. As such, advisory committees can and should play a role in identifying and communicating shortcomings in faculty members' supervisory practices.

Advisory committees (in full or in part) in some Faculties provide regular (at least once per year), formal assessments on students' academic progress, the successful attainment of which is necessary for a student to remain in Good Academic Standing.

Advisory committees are mandatory for PhD students and are recommended for research Master's students where the student is completing a thesis.

Membership and voting

The advisory committee members complementary fields of expertise should support the planning and execution of the student's research work. The minimum membership of a PhD student's advisory committee must include the supervisor(s) plus at least two regular faculty members from the University of Waterloo. At least one of these two regular faculty members must have an academic appointment in the student's home Department/School or Academic Program.

~~Advisory committees must include the student's supervisor(s) and at least two other full-time faculty members from the University of Waterloo whose complementary fields of expertise will support the planning and execution of the student's research work.~~

Advisory committees may include additional members, internal or external to the University, who possess expertise that will add value to the student's research work. Adjunct status is recommended for external members of an advisory committee but is not required.

When an advisory committee is performing an evaluative role for the student, such as assessing academic progression through committee meetings, additional members (other than the supervisor(s) and two regular Waterloo faculty members) will normally not be voting members of the committee. Exceptions can be made by the Associate Dean Graduate Studies in the student's home Faculty, on the recommendation of the student and the supervisor(s).

The role(s) of advisory committees should be made clear to both the committee members and the student, including the role in supporting and evaluating academic progression.

~~The minimum membership of a PhD student's advisory committee shall be the supervisor(s) plus two regular members of the University faculty, at least one of whom will have their primary appointment in the student's home academic program.~~

The University recommends the formation of the advisory committee as soon as is practical. For PhD students, the committee shall be established not later than the month following the student's successful completion of the Comprehensive or Qualifying examination.

Jurisdiction on membership

Normally, the composition of a PhD student's advisory committee shall be jointly decided by the student and the supervisor(s) and communicated to the Graduate Officer in the student's home unit. In some Faculties, membership of the advisory committee is approved by ~~at the discretion of~~ the Associate Dean Graduate Studies or their delegate.

Distinction between Advisory and Examining Committees

The primary role of the advisory committee is to provide support/feedback to the student throughout their research progression.

The primary role of the examining committee is to serve as evaluators of graduate students' research work at defined points coinciding with PhD comprehensive examinations, PhD thesis defenses and where appropriate, Master's defenses.

The examining committee evaluates the suitability of the student's research relative to the discipline and the stated degree level expectations of the student's level of study. In many cases, there will be overlap in membership of these committees. However, there may be members of the advisory committee who do not meet the requirements for membership on the examining committee.

A member of a student's advisory committee, who is not part of the examining committee, is not required to be a part of an examination. However, it is recognized that there may be value in the participation of all advisory committee members and thus, members are encouraged, where possible and appropriate, to play an active role in a student's examination (as a non-voting participant). This may include asking questions of the candidate during oral components of a comprehensive (or qualifying) examination or a defense.

The membership of examining committees for PhD students is defined for comprehensive examinations and for defenses. For Master's programs, see the Master's degree with thesis section of the Calendar.

~~Where applicable, the membership of examining committees for master's students is specified by the Faculty or the academic unit delivering the student's academic program.~~

2) Minimum requirements for PhD degree: Thesis examination

Description and rationale for proposed changes:

Updates to the Minimum requirements for PhD degree: Thesis examination regulations section are being made to provide additional clarity and to more closely reflect what is happening in practice, versus introducing new or changed regulations.

Proposed effective date: Term: Winter Year: 2026

Current **Graduate Studies Academic Calendar (GSAC)** page:
https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/policy/r1OoTvwRT

Current Calendar copy	Proposed Calendar copy
7.4.5 Minimum requirements for PhD degree: Thesis examination The PhD thesis examination is the culmination of the candidate's research program. The examination is intended to allow the candidate to demonstrate their mastery and expertise in the chosen area of study through a presentation of their research. The examination also presents an opportunity for the candidate's work to be subject to scholarly criticism by members of the academic community. Through the process of defending the thesis, the candidate further demonstrates their capacity to engage meaningfully in scholarly discourse in their chosen area. Based on an evaluation of the written thesis and the candidate's performance in the thesis examination, the examining committee will render a decision as to whether the candidate's work has satisfied the requirements for a PhD. **Thesis submission** When the thesis is accepted by the department and Faculty, and all other requirements for the degree have been met, the student must provide the University with an electronic copy, as appropriate, of their approved thesis as a final University degree requirement. Theses must be prepared and submitted as outlined on the Graduate Studies and Postdoctoral Affairs thesis	**7.4.5 Minimum requirements for PhD degree: Thesis examination** The PhD thesis examination is the culmination of the candidate's research program. The examination is intended to allow the candidate to demonstrate their mastery and expertise in the chosen area of study through a presentation of their research. The examination also presents an opportunity for the candidate's work to be subject to scholarly criticism by members of the academic community. Through the process of defending the thesis, the candidate further demonstrates their capacity to engage meaningfully in scholarly discourse in their chosen area. Based on an evaluation of the written thesis and the candidate's performance in the thesis examination, the examining committee will render a decision as to whether the candidate's work has satisfied the requirements for a PhD. **Thesis submission** When the thesis is accepted by the department and Faculty, and all other requirements for the degree have been met, the student must provide the University with an electronic copy, as appropriate, of their approved thesis as a final University degree requirement. Theses must be prepared and submitted as outlined on the Graduate Studies and Postdoctoral Affairs thesis

submission page.	submission page.
Prior to defence	**Prior to defence**
Prior to submitting the thesis, it is recommended that the candidate meet with their supervisor and the advisory committee. The candidate should seek endorsement that the research is of sufficient quality to proceed to defence and that the candidate is able to meet the requirements of the oral defence. Although a negative assessment does not prohibit the candidate from proceeding to defence, this should occur only in rare cases and is not recommended.	Prior to submitting the thesis, it is recommended that the candidate meet with their supervisor and the advisory committee. The candidate should seek endorsement that the research is of sufficient quality to proceed to defence and that the candidate is able to meet the requirements of the oral defence. Although a negative assessment does not prohibit the candidate from proceeding to defence, this should occur only in rare cases and is not recommended.
The responsibility for identifying possible external examiners lies with the supervisor or the co-supervisors. In no cases should a student be asked to lead that effort.	The responsibility for identifying possible external examiners lies with the supervisor or the co-supervisors. In no cases should a student be asked to lead that effort.
The Graduate Officer of the department in which the candidate is enrolled will recommend to the Faculty Associate Dean, Graduate Studies a PhD Thesis Examining Committee for approval. Sufficient information should be supplied in order to facilitate the Associate Dean's decision, including notes on adjunct appointments and declarations of any conflicts of interest.	The Graduate Officer of the department in which the candidate is enrolled will recommend to the Faculty Associate Dean, Graduate Studies a PhD Thesis Examining Committee for approval. Sufficient information should be supplied in order to facilitate the Associate Dean's decision, including notes on adjunct appointments and declarations of any conflicts of interest.
A date and location for the examination will be set according to availability of Examining Committee members. The candidate should be prepared to defend the thesis within 4 - 6 weeks of depositing it in the Faculty Graduate Studies Office (see Display Period below).	A date and location for the examination will be set according to availability of Examining Committee members. The candidate should be prepared to defend the thesis within 4 - 6 weeks of depositing it in the Faculty Graduate Studies Office (see Display Period below).
PhD thesis examining committee	**PhD thesis examining committee**
The PhD Thesis Examining Committee evaluates the quality of the student's written and oral communications related to the thesis relative to the standards of the discipline, the state of the practice in the field, and the degree expectations at the University of Waterloo. The committee consists of a minimum of five voting members: • External Examiner • Supervisor or Co-supervisors • Internal Member (from the ~~home department~~)	The PhD Thesis Examining Committee evaluates the quality of the student's written and oral communications related to the thesis relative to the standards of the discipline, the state of the practice in the field, and the degree expectations at the University of Waterloo. The committee consists of a minimum of five voting members comprised of an external examiner, and a minimum of four voting members who have an appointment with the University of Waterloo: • External Examiner • Supervisor or Co-supervisors

• Internal-external Member (external to the home ~~department~~) • Other Member(s) The PhD Thesis Examination is chaired by an impartial faculty member with Sole-Supervisory Privilege Status (SSPS2) from outside the candidate's department. The Chair is appointed by Graduate Studies and Postdoctoral Affairs (GSPA). The Chair is responsible for proper conduct of the examination and does not vote. **External Examiner** The external examiner must hold a doctorate and be knowledgeable in the field of the candidate's research. In addition, to ensure fairness and impartiality, the external examiner must be at arm's length from the candidate's thesis, candidate and supervisor(s), and must not be in a potential conflict of interest with regards to the outcome of the thesis examination. An external examiner should be selected such that there are no perceptions of potential bias or conflicts of interest between the external examiner, the student being evaluated and the supervisor(s). There is a conflict of interest when: • A proposed external examiner is, or was in the last six years, from the same university, organization or department, or belongs or belonged, in the last six years, to the same research unit as the supervisor(s) or candidate; or • There is an administrative or family link between the proposed external examiner and the supervisor(s) or candidate (e.g., head of the department, Dean of the Faculty, etc.); or • A proposed external examiner is an industrial or government representative or professional who is or was in the last six years directly involved in collaborative activities with the supervisor(s) or candidate; or • A proposed external examiner is a former research supervisor or graduate student of the supervisor(s) or candidate; or	• Internal Member (from the <u>student's home Department/School or Academic Program</u>) • Internal-external Member (external to the <u>student's</u> home <u>Department/School or Academic Program</u>) • Other Member(s) The PhD Thesis Examination is chaired by an impartial faculty member with Sole-Supervisory Privilege Status (SSPS2) from outside the candidate's department. The Chair is appointed by Graduate Studies and Postdoctoral Affairs (GSPA). The Chair is responsible for proper conduct of the examination and does not vote. **External Examiner** The external examiner must hold a doctorate and be knowledgeable in the field of the candidate's research. In addition, to ensure fairness and impartiality, the external examiner must be at arm's length from the candidate's thesis, candidate and supervisor(s), and must not be in a potential conflict of interest with regards to the outcome of the thesis examination. An external examiner should be selected such that there are no perceptions of potential bias or conflicts of interest between the external examiner, the student being evaluated and the supervisor(s). There is a conflict of interest when: • A proposed external examiner is, or was in the last six years, from the same university, organization or department, or belongs or belonged, in the last six years, to the same research unit as the supervisor(s) or candidate; or • There is an administrative or family link between the proposed external examiner and the supervisor(s) or candidate (e.g., head of the department, Dean of the Faculty, etc.); or • A proposed external examiner is an industrial or government representative or professional who is or was in the last six years directly

• A proposed external examiner has collaborated or published with the supervisor(s) or candidate within the past six years; or • A proposed external examiner is a planned future research supervisor or employer of the candidate or plans to collaborate or publish with the candidate in the foreseeable future; or • The proposed external examiner is uncomfortable with reviewing the proposal due to previous conflicts or any other reason (e.g., past student or supervisor, even if more than six years ago, or personal conflict); or • The Faculty Associate Dean, Graduate Studies, has reason to believe that a specific proposed external examiner should not be involved in the review. In cases where the candidate's thesis research has involved collaborations with other ~~local~~ members of the examining committee beyond the supervisor(s) within the past six years, the external examiner must be free of potential conflict of interest under the guidelines above with those members as well. Recommendation of an individual to serve as external examiner is made by the supervisor(s) or Graduate Officer/Associate Chair, Graduate Studies, as appropriate, to the Faculty, Associate Dean, Graduate Studies for approval. The Graduate Officer/Associate Chair is responsible for determining that the requirements for arm's length have been met, and the recommendation must be accompanied by a curriculum vitae covering the past six years and a conflict of interest statement, as well as full disclosure of any past affiliations involving the candidate and supervisor(s) to assist in confirming an arm's-length relationship. The Associate Dean is the contact for the external examiner regarding the thesis and its defence. At no point should the candidate be in communication with the external examiner prior to the defence. The Department may communicate with the external only for the purposes of other arrangements not related	involved in collaborative activities with the supervisor(s) or candidate; or • A proposed external examiner is a former research supervisor or graduate student of the supervisor(s) or candidate; or • A proposed external examiner has collaborated or published with the supervisor(s) or candidate within the past six years; or • A proposed external examiner is a planned future research supervisor or employer of the candidate or plans to collaborate or publish with the candidate in the foreseeable future; or • The proposed external examiner is uncomfortable with reviewing the proposal due to previous conflicts or any other reason (e.g., past student or supervisor, even if more than six years ago, or personal conflict); or • The Faculty Associate Dean, Graduate Studies, has reason to believe that a specific proposed external examiner should not be involved in the review. In cases where the candidate's thesis research has involved collaborations with other members of the examining committee beyond the supervisor(s) within the past six years, the external examiner must be free of potential conflict of interest under the guidelines above with those members as well. Recommendation of an individual to serve as external examiner is made by the supervisor(s) or Graduate Officer/Associate Chair, Graduate Studies, as appropriate, to the Faculty, Associate Dean, Graduate Studies for approval. The Graduate Officer/Associate Chair is responsible for determining that the requirements for arm's length have been met, and the recommendation must be accompanied by a curriculum vitae covering the past six years and a conflict of interest statement, as well as full disclosure of any past affiliations involving the candidate and supervisor(s) to assist in confirming an arm's-length relationship. The Associate Dean is the contact for the

to the defence (e.g. arrangements for a research talk). The external examiner must provide the Faculty Associate Dean, Graduate Studies with a written assessment of the thesis at least one week before the scheduled defence. Whether the assessment is positive or negative, the Associate Dean will copy the report of the external examiner only to the supervisor, who will inform the candidate of any major criticisms of the thesis, so that the student can respond to these, but the evaluation must not be shown to the candidate. The candidate may be shown the evaluation after the defence, with the permission of the external examiner. Should the assessment be negative, the Associate Dean may wish to advise that the candidate withdraw the dissertation and defend with the same external examiner at a later date. A candidate may withdraw the thesis only once. Despite a negative assessment, a candidate has the right to proceed to a defence. **Supervisor or Co-supervisors** The student's supervisor serves on the Examining Committee. In the case that there is more than one supervisor, all co-supervisors are expected to attend the defence and the supervisor vote is divided fractionally among the co-supervisors such that each may vote independently but the total supervisor vote (one) remains unchanged. Only with the approval of the Faculty Associate Dean, Graduate Studies may a co-supervisor be absent from the exam. In that case, the other co-supervisor, who must have Sole-Supervisory Privilege Status (SSPS2), will represent them. **Internal Member** The internal member ~~is from~~ the student's ~~home department and normally~~ drawn from the student's Advisory Committee. **Internal-External Member**	external examiner regarding the thesis and its defence. At no point should the candidate be in communication with the external examiner prior to the defence. The Department may communicate with the external only for the purposes of other arrangements not related to the defence (e.g. arrangements for a research talk). The external examiner must provide the Faculty Associate Dean, Graduate Studies with a written assessment of the thesis at least one week before the scheduled defence. Whether the assessment is positive or negative, the Associate Dean will copy the report of the external examiner only to the supervisor, who will inform the candidate of any major criticisms of the thesis, so that the student can respond to these, but the evaluation must not be shown to the candidate. The candidate may be shown the evaluation after the defence, with the permission of the external examiner. Should the assessment be negative, the Associate Dean may wish to advise that the candidate withdraw the dissertation and defend with the same external examiner at a later date. A candidate may withdraw the thesis only once. Despite a negative assessment, a candidate has the right to proceed to a defence. **Supervisor or Co-supervisors** The student's supervisor serves on the Examining Committee. In the case that there is more than one supervisor, all co-supervisors are expected to attend the defence and the supervisor vote is divided fractionally among the co-supervisors such that each may vote independently but the total supervisor vote (one) remains unchanged. Only with the approval of the Faculty Associate Dean, Graduate Studies may a co-supervisor be absent from the exam. In that case, the other co-supervisor, who must have Sole-Supervisory Privilege Status (SSPS2), will represent them. **Internal Member**

The internal-external should have suitable knowledge of the subject matter of the dissertation and is ~~normally~~ external to the student's home department. The internal-external member ensures that the thesis meets University standards of quality and helps to assess the performance of the candidate at the defence. In rare cases, identifying an internal-external who is able to make a meaningful contribution to the examination is problematic. In such circumstances, the requirement that the Internal-External be external to the department may be waived by the Faculty Associate Dean, Graduate Studies based on a rationale provided by the Graduate Officer. ~~Holding an adjunct or cross appointment in the student's home department does not preclude serving as an internal-external.~~ **Member** Normally, this committee member is drawn from the student's Advisory Committee. ~~The member normally holds a tenured or tenure track position at the University of Waterloo or has another type of ongoing faculty appointment.~~ **Adjunct faculty on Examining Committees** ~~In some cases it may be beneficial for a student to have access to the expertise of a particular adjunct faculty member. The Faculty Associate Dean, Graduate Studies may give permission for an adjunct faculty member to serve on the Examining Committee as the Internal-External or Member, provided that the Adjunct faculty members holds a PhD. No more than one adjunct faculty member (including Professors Emeriti) may serve on the Examining Committee, with the exception of cotutelle student defences, which may involve the participation of more than one adjunct faculty member~~. **Display period** When a candidate is ready to proceed to defence, they must submit an electronic copy,	The internal member must hold a regular faculty appointment within the student's home Department/School or Academic Program. Normally the Internal Member is drawn from the student's Advisory Committee. **Internal-External Member** The internal-external should have suitable knowledge of the subject matter of the dissertation and is external to the student's home Department/School or Academic Program but holds a faculty appointment with the University of Waterloo. The internal-external member ensures that the thesis meets University standards of quality and helps to assess the performance of the candidate at the defence. Holding an adjunct or cross appointment in the student's home Department/School or Academic Program does not preclude serving as an internal-external. In rare cases, identifying an internal-external who is able to make a meaningful contribution to the examination is problematic. In such circumstances, the requirement that the Internal-External be external to the department may be waived by the Faculty Associate Dean, Graduate Studies based on a rationale provided by the Graduate Officer. **Other Member** Normally, this committee member is drawn from the student's Advisory Committee. See section 7.1 Graduate students' supervisors and committees for guidance on faculty roles at the University and eligibility for membership on examining committees. **Adjunct faculty on Examining Committees** In certain cases, it may be beneficial for a student's work to be evaluated by an adjunct faculty member, distinct from the External Examiner, who possesses specific expertise relevant to the research. With approval from the Faculty Associate Dean, Graduate Studies, an adjunct faculty member holding a PhD may serve on the Examining Committee as the Internal-External or Other Member.

as appropriate, of the thesis to the Faculty Graduate Office. The thesis is distributed to members of the PhD Thesis Examining Committee and a copy is available in the Faculty Graduate Office for at least four weeks, where it may be requested by any member of the University ~~for examination~~. The submission of the thesis, as well as the date and location of its defence, are announced publicly. In cases where a student's research contains content that may warrant restrictions on its dissemination (e.g., for intellectual property or personal safety reasons), the student may request to have the display of the thesis restricted and the defence closed to the public. Guidelines on these situations are below. Members of the PhD Thesis Examining Committee who have major criticisms of the thesis are encouraged to submit written comments to the Faculty Associate Dean, Graduate Studies no later than one week before the thesis defence. The Faculty Associate Dean will share these concerns with the supervisor and candidate. If written comments are not submitted in advance, criticisms can be discussed at the defence but should not be discussed with other members of the Examining Committee prior to the defence. **Guidelines for thesis examination without public disclosure** Central to the University of Waterloo's mission is the creation and dissemination of knowledge. As new scholars, graduate students are expected to disclose and publicly defend their research results to ensure review from their peers and acceptance and inclusion of their findings in open scholarly discourse. At times, graduate students may wish to protect their research results, particularly when they contain material of commercial or marketable value, or when restricted by a publication agreement. It is expected that in the vast majority of these cases that	<u>Only one adjunct faculty member may serve on the Examining Committee. This includes retired faculty (with adjunct status). This limit excludes co-supervisors (with adjunct status). An exception is made for cotutelle student defences, which may involve more than one adjunct faculty member.</u> **Display period** When a candidate is ready to proceed to defence, they must submit an electronic copy, as appropriate, of the thesis to the Faculty Graduate Office. The thesis is distributed to members of the PhD Thesis Examining Committee and a copy is available in the Faculty Graduate Office for at least four weeks, where it may be requested by any member of the University. The submission of the thesis, as well as the date and location of its defence, are announced publicly. In cases where a student's research contains content that may warrant restrictions on its dissemination (e.g., for intellectual property or personal safety reasons), the student may request to have the display of the thesis restricted and the defence closed to the public. Guidelines on these situations are below. Members of the PhD Thesis Examining Committee who have major criticisms of the thesis are encouraged to submit written comments to the Faculty Associate Dean, Graduate Studies no later than one week before the thesis defence. The Faculty Associate Dean will share these concerns with the supervisor and candidate. If written comments are not submitted in advance, criticisms can be discussed at the defence but should not be discussed with other members of the Examining Committee prior to the defence. **Guidelines for thesis examination without public disclosure** Central to the University of Waterloo's mission is the creation and dissemination of

protection of the intellectual property will be obtained in a timely manner, well before the preparation and examination of the student's thesis (for example in the form of filing a patent application). Similarly, students may engage in sensitive research areas which may present personal risks. In these rare cases, it may be necessary to restrict the disclosure of thesis results from the public arena. In cases where private companies or other supporting organizations are involved in the research through a research contract or agreement, this request may be required by the terms of that agreement. In these cases, the student with supervisor's endorsement shall at the time of thesis submission request that the thesis be shared only with the examining committee. Similarly, the student and the supervisor shall request a defence that is not open to the public. The student and supervisor shall articulate the motivations for the restriction of the thesis and attendance at the defence. These requests will be received and adjudicated by the Associate Dean Graduate Studies in the student's home Faculty. If granted, the student's thesis will not be available publicly prior to the defence. The members of the examining committee, including the external examiner, may be asked to sign a non-disclosure agreement prior to evaluating the completed thesis or attending the defence. When the thesis is accepted by the examining committee, the student may seek to have their thesis embargoed. **Thesis written in French** L'université de Waterloo offre aux étudiants la possibilité de rédiger les thèses de doctorat et de maîtrise en français. Ceci n'est pas un droit de l'étudiant ou de l'étudiante. Mise à part la condition évidente de la compétence linguistique du candidat ou de la candidate par rapport au domaine étudié, il est nécessaire de satisfaire à d'autres exigences.	knowledge. As new scholars, graduate students are expected to disclose and publicly defend their research results to ensure review from their peers and acceptance and inclusion of their findings in open scholarly discourse. At times, graduate students may wish to protect their research results, particularly when they contain material of commercial or marketable value, or when restricted by a publication agreement. It is expected that in the vast majority of these cases that protection of the intellectual property will be obtained in a timely manner, well before the preparation and examination of the student's thesis (for example in the form of filing a patent application). Similarly, students may engage in sensitive research areas which may present personal risks. In these rare cases, it may be necessary to restrict the disclosure of thesis results from the public arena. In cases where private companies or other supporting organizations are involved in the research through a research contract or agreement, this request may be required by the terms of that agreement. In these cases, the student with supervisor's endorsement shall at the time of thesis submission request that the thesis be shared only with the examining committee. Similarly, the student and the supervisor shall request a defence that is not open to the public. The student and supervisor shall articulate the motivations for the restriction of the thesis and attendance at the defence. These requests will be received and adjudicated by the Associate Dean Graduate Studies in the student's home Faculty. If granted, the student's thesis will not be available publicly prior to the defence. The members of the examining committee, including the external examiner, may be asked to sign a non-disclosure agreement prior to evaluating the completed thesis or attending the defence.

Lorsqu'un candidat ou une candidate demande à son département de rédiger sa thèse en français dans le cadre de ce règlement, il ou elle doit soumettre une déclaration d'appui de la part de son directeur ou sa directrice de thèse, des membres éventuels du comité de supervision et d'évaluation, ainsi que leur accord d'appartenir à ce comité. Tous les membres du comité doivent posséder un niveau de compétence linguistique tel qu'il leur permettra d'évaluer avec pertinence, à la fois le contenu et la présentation du matériel examiné. The University of Waterloo offers students the opportunity to write doctoral and master's theses in French. This is not a right of the student. Apart from the obvious condition of the candidate's linguistic competence in relation to the field studied, there are other requirements that must be met. When a candidate asks their department to write their thesis in French within the framework of this regulation, they must submit a declaration of support from their supervisor, any members of their advisory and examining committee, and their agreement to serve on this committee. All committee members must possess a level of linguistic proficiency that will enable them to appropriately evaluate both the content and presentation of the material examined.	When the thesis is accepted by the examining committee, the student may seek to have their thesis embargoed. **Thesis written in French** L'université de Waterloo offre aux étudiants la possibilité de rédiger les thèses de doctorat et de maîtrise en français. Ceci n'est pas un droit de l'étudiant ou de l'étudiante. Mise à part la condition évidente de la compétence linguistique du candidat ou de la candidate par rapport au domaine étudié, il est nécessaire de satisfaire à d'autres exigences. Lorsqu'un candidat ou une candidate demande à son département de rédiger sa thèse en français dans le cadre de ce règlement, il ou elle doit soumettre une déclaration d'appui de la part de son directeur ou sa directrice de thèse, des membres éventuels du comité de supervision et d'évaluation, ainsi que leur accord d'appartenir à ce comité. Tous les membres du comité doivent posséder un niveau de compétence linguistique tel qu'il leur permettra d'évaluer avec pertinence, à la fois le contenu et la présentation du matériel examiné. The University of Waterloo offers students the opportunity to write doctoral and master's theses in French. This is not a right of the student. Apart from the obvious condition of the candidate's linguistic competence in relation to the field studied, there are other requirements that must be met. When a candidate asks their department to write their thesis in French within the framework of this regulation, they must submit a declaration of support from their supervisor, any members of their advisory and examining committee, and their agreement to serve on this committee. All committee members must possess a level of linguistic proficiency that will enable them to appropriately evaluate both the content and presentation of the material examined.

3) Residence requirements

Description and rationale for proposed changes:

Updates to the Residence requirements definition are being made to account for Accelerated Master's programs which are not explicitly identified in the current GSAC section. This inclusion aligns with current practice within these programs.

Proposed effective date: Term: Winter Year: 2026

Current **Graduate Studies Academic Calendar (GSAC)** page:
https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/policy/B1eZ_iDCp

<table>
<tr><th>Current Calendar copy</th><th>Proposed Calendar copy</th></tr>
<tr>
<td>

13.3 Residence requirements

In order for a student to receive a University of Waterloo degree, the student must satisfy a residence requirement – a cumulative student term count that meets or exceeds minimum values. A student's time in residence at the University is calculated using the values associated with the student's enrolment status in their program (part-time or full-time). The minimum residence requirements are contained in the table below.

<table>
<tr><th>Master's</th><th>PhD</th></tr>
<tr>
<td>• Two terms (2.0) in the Master of Accounting program
• Three terms (3.0) from an Honours Bachelor's degree</td>
<td>• Six terms (6.0) from a Master's degree
• Nine terms (9.0) from an Honours Bachelor's degree</td>
</tr>
</table>

A student who, based on unique circumstances, seeks to have these residence requirements waived must seek and receive written approval from the Associate Dean, Graduate Studies in the student's home Faculty.

</td>
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<table>
<tr><th>Master's</th><th>PhD</th></tr>
<tr>
<td>• Two terms (2.0) in the Master of Accounting program
• <u>Two terms (2.0) in an Accelerated Master's program</u>
• Three terms (3.0) from an Honours Bachelor's degree</td>
<td>• Six terms (6.0) from a Master's degree
• Nine terms (9.0) from an Honours Bachelor's degree</td>
</tr>
</table>

A student who, based on unique circumstances, seeks to have these residence requirements waived must seek and receive written approval from the

</td>
</tr>
</table>

	Associate Dean, Graduate Studies in the student's home Faculty.

4) English language proficiency

Description and rationale for proposed changes:

Updates to the English language proficiency regulations are being made to include the new TOEFL score scale. TOEFL is moving their scoring from the current 120 scale to a 1-6 score scale. TOEFL is making this change to a) provide more intuitive alignment with the Common European Framework of Reference for Languages (CEFR) scores, b) give a clearer connection to many students' prior English learning and assessment experiences, which are often guided by CEFR, and c) deliver consistent scores across each section. The EFAS scores are also being updated to align with the new TOEFL scores. These new scores have been reviewed by colleagues at Renison's English Language Institute.

Proposed effective date: Term: Winter Year: 2026

Current **Graduate Studies Academic Calendar (GSAC)** page:
https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/policy/SJDLMPJAa

3.10 English language proficiency

The official language of instruction at the University of Waterloo is English. It is the responsibility of the University to ensure that its graduate students have sufficient English language skills to be successful with the demands of the academic environment.

Applicants are exempt from submitting an English language proficiency (ELP) examination score if any one of the following conditions is true:

- Applicants have completed three or more years of post-secondary education or completed a graduate degree at a Canadian institution or university
- Applicants have completed three or more years of post-secondary education or completed a graduate degree at a university at which English was the primary language of instruction, as indicated on our ELP exemption list*
- Applicants have been employed for at least three years in a position in which English was the language of business in a country listed on our ELP exemption list*

*Information on approved ELP exempted countries and institutions is available on the Graduate Studies and Postdoctoral Affairs website.

Tests must have been taken within the last 24 months at the time the application is submitted. Tests that do not appear on this chart are not accepted for admission consideration. The University of Waterloo reserves the right to request an English language test result from any applicant.

For students who do not meet the minimum English language requirements, a conditional offer of admission may be extended with requirements to complete specific language training as specified in their offer of admission, either prior to, or concurrent with their program registration. In some programs, and under certain conditions, students may satisfy the English language requirements by successfully completing the English for Academic Success (EFAS) at the level

required for the intended program of study, with an enrichment component in Graduate Studies Preparation.

Graduate Studies accepted examinations and required scores

Internet-based TOEFL (iBT) (1-6 score scale)	**Internet-based TOEFL (iBT) (effective prior to Winter 2026)**	**IELTS (Academic)**	**Cambridge English test (C1 Advanced or C2 Proficiency)**	**CAEL**	**PTE (Academic)**	**EFAS**
4.5; writing 5; speaking 5	90; writing 25; speaking 25	7.0; writing 6.5; speaking 6.5	185; minimum 176 in each area	70; 60 per band; 70 writing; 70 speaking	63; writing 65; speaking 65	75% overall in level 400 with at least 70% in EFAS 420, 440 and 460 ~~75% in writing, oral and academic skills~~

Graduate Studies accepted examinations and alternative minimum scores

Departments accepting the alternative minimum scores are: Chemical Engineering; Civil and Environmental Engineering; Electrical and Computer Engineering; Mechanical and Mechatronics Engineering; and Systems Design Engineering.

Internet-based TOEFL (iBT) (1-6 score scale)	**Internet-based TOEFL (iBT) (effective prior to Winter 2026)**	**IELTS (Academic)**	**Cambridge English test (C1 Advanced or C2 Proficiency)**	**CAEL**	**PTE (Academic)**	**EFAS**
4.5; writing 4.5; speaking 4; reading 4; listening 4	80; writing 22; speaking 20; reading 20; listening 18	6.5; writing 6.0; speaking 6.0	176; minimum 169 in each area	60; 60 per band	60; writing 60; speaking 60	75% overall in level 300 with at least 70% in EFAS 320, 340 and 360 ~~75% in writing, oral and academic skills or 70% in level 400 with at least 70% in writing, oral and academic skills~~

Graduate Studies accepted examinations and alternative higher scores

Departments/Schools/programs requiring higher scores are:

- Faculty of Arts: Accounting and Finance; Anthropology; Classical Studies; Digital Experience Innovation; English Language and Literature; Fine Arts; History; Philosophy; Public Service; Religious Studies; Sociology and Legal Studies
- Faculty of Engineering: Architecture, Doctor of Philosophy (PhD) in Entrepreneurship and Organization
- Faculty of Environment: Climate Change; Climate Risk Management; Development Practice; Economic Development and Innovation; Environment and Business; Environment, Resources and Sustainability; Future Cities; Geography and Environmental Management; Global Governance; Planning; Sustainability Management
- Faculty of Health: Kinesiology and Health Sciences; Public Health Sciences; Recreation and Leisure Studies
- Faculty of Mathematics: Data Science and Artificial Intelligence

Internet-based TOEFL (iBT) (1-6 score scale)	**Internet-based TOEFL (iBT) (effective prior to Winter 2026)**	**IELTS (Academic)**	**Cambridge English test (C1 Advanced or C2 Proficiency)**	**CAEL**	**PTE (Academic)**	**EFAS**
5; writing 5; speaking 5	100; writing 26; speaking 26	7.5; writing 7.0; speaking 7.0	191; minimum 185 in each area	70; 60 per band; 70 writing; 70 speaking	68; writing 65; speaking 65	75% overall in level 400 with at least 75% in EFAS 420, 440 and 460 ~~80% overall in level 400 with at least 75% in writing, oral and academic skills~~

Graduate Studies accepted examinations and alternative scores for Computer Science programs

Internet-based TOEFL (iBT) (1-6 score scale)	**Internet-based TOEFL (iBT) (effective prior to Winter 2026)**	**IELTS (Academic)**	**Cambridge English test (C1 Advanced or C2 Proficiency)**	**CAEL**	**PTE (Academic)**	**EFAS**
5.0; writing 4.5; speaking 4	93; writing 22; speaking 22	6.5; writing 6.0;	180; minimum 176 in each area	70; 60 per band; 70	63; writing 65;	75% overall in level 400 with at least 70% in 420, 440 and

Internet-based TOEFL (iBT) (1-6 score scale)	**Internet-based TOEFL (iBT) (effective prior to Winter 2026)**	**IELTS (Academic)**	**Cambridge English test (C1 Advanced or C2 Proficiency)**	**CAEL**	**PTE (Academic)**	**EFAS**
		speaking 6.5		writing; 70 speaking	speaking 65	460 ~~writing, oral and academic skills~~

5) Graduate research fields

Description and rationale for proposed changes:

Updates to the Graduate research fields definition are being made to reflect current practice and clarify when fields appear on student transcripts.

Proposed effective date: Term: Winter Year: 2026

Current **Graduate Studies Academic Calendar (GSAC)** page:
https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/policy/SJogLjyA6

Current Calendar copy	Proposed Calendar copy
9.3 Graduate research fields Graduate research fields are used to better define a student's contributions to a specific area within a discipline, when the broader program definition is insufficient to appropriately represent (to academic and professional audiences) the student's research foci. Graduate programs and research areas are often defined by the administrative unit (e.g. department or school) within which the graduate student or supervisor is appointed. Graduate research fields: • are reported to Quality Council as part of the major modification report; • may have a corresponding unique set of required and elected courses; • should not require additional academic accomplishments beyond the normal degree requirements; • should be a recognized area of research; • ~~are recognized on the student's transcript but not on the diploma.~~ Research fields are normally specified at the time of application and may be added or modified at the request of the student, with approval from the supervisor(s) and program. Normally, students' research will not make sufficient contributions to multiple sub-disciplines to merit a designation for more	**9.3 Graduate research fields** Graduate research fields are used to better define a student's contributions to a specific area within a discipline, when the broader program definition is insufficient to appropriately represent (to academic and professional audiences) the student's research foci. Graduate programs and research areas are often defined by the administrative unit (e.g. department or school) within which the graduate student or supervisor is appointed. Graduate research fields: • are reported to Quality Council as part of the major modification report; • may have a corresponding unique set of required and elected courses; • should not require additional academic accomplishments beyond the normal degree requirements; • should be a recognized area of research; • are recognized on the student's transcript but not on the diploma; • are not recognized on the student's transcript. Exceptions to this will be articulated in a program's degree requirements section of the Calendar; • are not recognized on the student's diploma. Research fields are normally specified at the time of application and may be added or modified at the request of the student, with

than two fields. Academic units who wish to designate research fields are encouraged to include specific course requirements that support the learning outcomes associated with that field. An assessment of whether or not the student's completed research warrants the field designation should be completed by the Department or Faculty at the time of degree completion.	approval from the supervisor(s) and program. Normally, students' research will not make sufficient contributions to multiple sub-disciplines to merit a designation for more than two fields. Academic units who wish to designate research fields are encouraged to include specific course requirements that support the learning outcomes associated with that field. An assessment of whether or not the student's completed research warrants the field designation should be completed by the Department or Faculty at the time of degree completion.

UNIVERSITY OF WATERLOO | Graduate Studies and Postdoctoral Affairs

October 9, 2025

TO: Ashley Day, Associate University Secretary
Tony Ly, Governance Officer

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

RE: Agenda items for Senate Graduate Council – October 2025

Awards for Consent

a) Faculty of Mathematics Provost's Distinguished Inclusivity Doctoral Entrance Award (Math PD-IDEA) - operating

This award is being set up to supplement the Provost's Distinguished Inclusivity Doctoral Entrance Award (PD-IDEA) funded through the central operating budget. After the central operating budget, allocated to the Faculty of Mathematics has been exhausted, additional awards for the fiscal year will be paid from the Faculty of Mathematics operating account. Eligibility and selection criteria will be the same as the centrally-supported award.
This math-specific award will not be advertised in the Awards Database.

b) Thomas G. Howe Memorial Graduate Scholarship – trust

A scholarship valued at $5,000 will be provided to a full-time domestic graduate student entering first year of the doctoral program in any department in the Faculty of Engineering. Selection to be based on academic excellence and the student's application for admission; particular attention will be given to the student's goals and objectives for their graduate studies, and any notable accomplishments from previous post-secondary degrees that demonstrate their qualifications or potential. The Faculty of Engineering Graduate Studies Office will make final selection each spring term. This fund is made possible by a donation from Teresa Howe in memory of her husband, Thomas Howe BASc '74 Engineering alumnus.

c) Frank Deeg International Experience Award – endowment

An award, valued at $4,500, will be provided annually to a third- or fourth-year undergraduate student or a student enrolled in a graduate program within the Faculty of Engineering (excluding the School of Architecture). Selection will be based on academic excellence combined with the pursuit of an international co-op placement or internship that is providing minimal pay. Preference will be given to students who will be working with a non-governmental or international organization in fields such as international development, peace and security initiatives, international trade, and international efforts to meet global challenges such as climate change, energy supply transitions, health and medical advances and food production, or a related area. Interested students should submit an International Experience Award application by March 15 each year. This fund is made possible by a donation from Frank and Kathryn Deeg to encourage and empower students to explore engineering co-op or internship experiences and future careers that intersect with global challenges and international development opportunities.

Awards for information

d) Dean of Engineering Doctoral Perseverance Award – trust

Created in June 2025, the Faculty is amending one of the criteria of the award by adding the addition that students must be on track to complete their doctoral program within one year of applying for the award. The rest of the terms remain the same.

e) Carl A. Pollock Postgraduate Fellowship – endowment

Originally established in 1979 to provide awards of $7,000, the award was revised in the ‘80s such that the value of the award would match the value of NSERC graduate scholarships. As of September 2024, the NSERC award value increased to $40,000 which the endowment expendable can no longer sustain. As such, the Faculty has decided to de-couple this award from the NSERC scholarship values. The value will be $23,000 and may grow as the endowment can sustain a larger valued scholarship. The updated award description, effective 2026-2027, will be as follows:

> One scholarship, valued at approximately $23,000, will be awarded annually to a graduate student pursuing a doctoral degree in the Faculty of Engineering at Waterloo. Eligible students must have received an undergraduate degree from an Engineering program at Waterloo. Interested students should submit an application by a department-specified deadline. Selection will be made by a committee within the Faculty of Engineering graduate office. Awards will be paid across 3 academic terms starting in the fall term. While not automatically renewable, a recipient may re-apply and be considered for a further one-year scholarship. The scholarship cannot be held concurrently with another major scholarship (e.g., tri-agency or Ontario Graduate Scholarship).

f) Mehta-Jenner Climate Change Mitigation Graduate Scholarship – trust

Originally established in 2020, the terms are being amended to broaden the eligibility criteria to include students in doctoral programs. With this change, the scholarship should be awarded with greater ease.

The updated award description is as follows:

Two scholarships, valued at $10,000 each, will be awarded annually to graduate students who identify as women who are registered full time in a Master's or Doctoral program in the Faculty of Mathematics, wherein women are underrepresented. Students must be conducting research on assessment and/or mitigation of climate change. Preference will be given to international students. Interested students must complete and submit an application at the beginning of April. The application can be found on the Faculty of Mathematics website. Selection will be made by the Office of the Associate Dean for Graduate Studies in the Faculty of Mathematics. This fund is made possible by a donation from Adarsh Mehta, BMath'98, Applied Mathematics, and Jeffrey Jenner, BMath'84, Math Accounting.

SGC - Consent Agenda - Faculty of Engineering - October 23, 2025

Meeting Information

Agenda Page Title
SGC - Consent Agenda - Faculty of Engineering - October 23, 2025

Career Level
Graduate

Faculty/Unit
Engineering

Date
2025/10/23

Time

Location

Summary

Course Changes:

1) Biomedical Engineering: 1 course revision

2) Electrical and Computer Engineering: 1 course revision

Program Changes:

1) Biomedical Engineering:

Doctor of Philosophy (PhD) in Biomedical Engineering:
1.1) Adding SYDE 652, MSE 619, and ECE 757A to the field-specific course requirements list. Removing ECE 750 Topic 33 from the field-specific course requirements list.
1.2) Revising the courses direct entry PhD students are required to complete.

Master of Applied Science (MASc) in Biomedical Engineering:
1.3 Adding SYDE 652, MSE 619, and ECE 757A to the field-specific course requirements list.

Other Business

Attachment(s)

Course Proposals

Course Proposal Details

Courses: Retire

No proposals have been added.

Courses: New

No proposals have been added.

Courses: Changes

Code	Title	Type	Workflow Step
BME 601	Physiological Systems and Biomedical Design	Course	SGC, Senate Graduate Council (SGC) | Under Review
ECE 661	Power System Protection and Relaying	Course	SGC, Senate Graduate Council (SGC) | Under Review

Programs & Plans Proposals

Programs & Plans Proposal Details

Programs & Plans: Retire

No proposals have been added.

Programs & Plans: Major Modifications

No proposals have been added.

Programs & Plans: Minor Modifications

Code	Title	Type	Workflow Step
PhD in Biomedical Engineering	Doctor of Philosophy (PhD) in Biomedical Engineering	Program	SGC, Senate Graduate Council (SGC) | Under Review
MASc in Biomedical Engineering	Master of Applied Science (MASc) in Biomedical Engineering	Program	SGC, Senate Graduate Council (SGC) | Under Review

Regulations Proposals

Regulations Proposal Details

Regulations: Retire

No proposals have been added.

Regulations: New

No proposals have been added.

Regulations: Changes

No proposals have been added.

BME 601
Physiological Systems and Biomedical Design

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Antirequisites
- Admin Notes
- Effective Term and Year

Effective Date & Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Winter 2025

Quest Course ID
16829

Offering Number
1

Proposal Details

Proposal Type
Change

Academic Unit Approval
2025/05/21

Rationale for Change
There is some course content overlap between BME 601 and ECE 601. Therefore, we would like to add ECE 601 as an antirequisite to BME 601.

Consultations

Supporting Documentation

Course Information

Faculty
Faculty of Engineering

Academic Unit
Dean of Engineering Office

Subject Code
BME

Number
601

Title
Physiological Systems and Biomedical Design

Abbreviated Title
Physiol Systms & Biomed Design

Description
This course surveys the anatomy and physiology of the human body at the cellular, organ and whole-body scale, from a systems biology/physiology perspective. Cell biology and some of the physiological systems (e.g., musculoskeletal, cardiovascular, pulmonary, digestive, renal, nervous and sensory, and immune) and their integration/interactions will be introduced from a quantitative systems perspective. Where applicable, common sources of impairments of each system (e.g., pathologies, aging, etc.) will be presented along with implications for diagnostic, therapeutic and rehabilitative technologies (and universal design). Students will be required to perform engineering design that applies their knowledge in biology and physiology that they have gained throughout the course.

Units
0.50

Exceptions to Fees or Academic Progress Units
No

Components
Lecture

Primary Component
Lecture

Grading Information

Grading Basis
Numerical Grading Basis

Cross-Listing Information

Is this course cross-listed?
No

Repeatable Courses

Can this course be repeated for credit?
No

Enrolment Rules

Consent to Add
No consent required

Consent to Drop
No consent required

Prerequisites
No Rules

Corequisites
No Rules

Antirequisites

- **Not completed nor concurrently enrolled in:**
  - **ECE601 - Foundations of Biology in Engineering (0.50)**

Course Notes

Fee Statement

Workflow Information

Workflow Path
Committee approvals

Faculty/AFIW Path(s) for Workflow
Faculty of Engineering

Dependencies

Dependent Courses and Programs/Plans
There are no dependencies

ECE 661
Power System Protection and Relaying

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Effective Term and Year
- Number
- Antirequisites

Effective Date & Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Fall 2023

Quest Course ID
16038

Offering Number
1

Proposal Details

Proposal Type
Change

Academic Unit Approval
2024/06/13

Rationale for Change
This course is a core course for the research field “Power and Energy Systems.” Core courses teach fundamental material in a research field and a 600-level number is more appropriate for such courses.

Consultations

Supporting Documentation

Course Information

Faculty
Faculty of Engineering

Academic Unit
Department of Electrical and Computer Engineering

Subject Code
ECE

Proposed
Number
661

Existing
Number
765

Title
Power System Protection and Relaying

Abbreviated Title
PowerSys Protection & Relaying

Description
This course focuses on the protection of various components of a power system including transmission lines, rotating machinery, transformers, busbars, reactors, capacitors and distribution lines. The course will review the fundamental features of a reliable protection system and will discuss the major components of a protection system including current and voltage transformers, circuit breakers, and relays. Various protection strategies such as nonpilot overcurrent protection, nonpilot distance protection, pilot protection and differential protection will be discussed in this course.

Units
0.50

Exceptions to Fees or Academic Progress Units
No

Components
LectureOnline

Primary Component
Lecture

Grading Information

Grading Basis
Numerical Grading Basis

Cross-Listing Information

Is this course cross-listed?
No

Repeatable Courses

Can this course be repeated for credit?
No

Enrolment Rules

Consent to Add
No consent required

Consent to Drop
No consent required

Prerequisites
No Rules

Corequisites
No Rules

Antirequisites

- **Not completed nor concurrently enrolled in: ECE765**

Course Notes

Fee Statement

Workflow Information

Workflow Path
Committee approvals

Faculty/AFIW Path(s) for Workflow
Faculty of Engineering

Dependencies

Dependent Courses and Programs/Plans

There are no dependencies

PhD in Biomedical Engineering
Doctor of Philosophy (PhD) in Biomedical Engineering

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Graduate Course Requirements
- Effective Term and Year

Effective Date and Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Fall 2025

Proposal Details

Proposal Type
Change

Academic Unit Approval
2025/05/21

Quality Assurance Designation
Minor Modification

Is there an impact to existing students?
Yes

Impact on Existing Students
1) Registered students will be allowed to count these courses as part of their field-specific course requirement.
2) Current direct entry BME PhD students can take 2 core courses and 1 field-specific course, unless they would prefer to take 2 field-specific courses and 1 core course (whichever is in the student's favour). Direct entry BME PhD students admitted as of the Winter 2026 term and after will be required to take 1 core course and 2 field-specific courses.

Is the credential name changing?
No

Graduate Co-operative Requirements
Not Applicable

Change to Learning Outcomes
No

Rationale and Background for Change(s)
1) Adding SYDE 652, MSE 619, and ECE 757A to the field-specific course requirements list. Removing ECE 750 Topic 33 from the field-specific course requirements list: We are requesting to add two courses to the field-specific course requirement. These courses relate to our five fields, and therefore students who take these courses should have them count towards their field-specific course requirement. We are also requesting to add ECE 757A and remove ECE 750 Topic 33 as ECE 757A was created in place of ECE 750 Topic 33. Therefore, ECE 757A will be offered and ECE 750 Topic 33 will no longer be offered.
2) Revising the courses direct entry PhD students are required to complete: We are requesting to change the courses direct entry BME PhD students are required to take. Currently, direct entry BME PhD students are required to take 2 core courses and 1 field-specific course. We are requesting to change this to 1 core course and 2 field-specific courses. This is because direct entry students should have adequate knowledge in quantitative engineering approach to human physiology. Taking two field-specific courses will be more beneficial as these courses will directly relate to the student's research. Also, since supervisors are required to approve the courses that their students take, a supervisor can request their student to take an additional core course as part of their elective course allotment if necessary.

Consultations (Departmental)

Supporting Documentation

General Program/Plan Information

Faculty
Faculty of Engineering

Academic Unit
Dean of Engineering Office

Graduate Field of Study
Biomedical Engineering

Faculty
Faculty of Engineering

Program/Plan Name
Doctor of Philosophy (PhD) in Biomedical Engineering

Graduate Credential Type
PhD

Accelerated Program
Not applicable

Program Types

Admit Term(s)
Fall
Winter
Spring

Delivery Mode
On-campus

Delivery Mode Information

Length of Program

- Students are required to complete the program in accordance with the University program time limits.

Registration Option(s)
Full-time

Registration Options Information

Graduate Research Fields

- Biomaterials, Tissue Engineering, and Drug Delivery
- Biomechanics and Rehabilitation
- Biomedical Signals and Devices
- Biomedical Imaging Technology
- Biomedical Informatics

Graduate Specializations

Additional Program Information

Admissions

Admission Requirements: Minimum Requirements

- PhD (regular entry) applicants who completed a research thesis-based master's degree (or equivalent) in engineering, applied science, or science from a recognized institution with at least an overall 80% average and documented evidence of potential to excel in PhD studies and research.
- PhD (direct from Honours Biomedical Engineering (BME) undergraduate entry) applicants require a minimum overall average of 80% in a BME program at the undergraduate level and clear evidence of excellent potential to excel in PhD studies and research. Substantial research experience is expected.
- Applicants who are deemed by the graduate coordinator, BME graduate program director, Admissions Committee or intended advisor to have an inadequate depth of technical BME background may be directed to take additional foundational courses, to be specified at the time of admission.
- English language proficiency (ELP) (if applicable)

Admission Requirements: Application materials

- Résumé
- Supplementary information form
- Transcript(s)

Admission Requirements: References

- Number of references: 3
- Type of references: 2 from academic sources that are able to comment upon academic preparation and research ability.

Requirements Information

Graduate Degree Requirements

- Students must complete the course and milestone requirements listed below in addition to the Graduate Academic Integrity Module (Graduate AIM).

Graduate Course Requirements

No Rules

Proposed

Graduate Course Requirements

- Students are required to successfully complete 4 graduate-level courses (with unit weights of 0.50 each), including 1 core biomedical engineering course (BME 601, BME 602, or BME 603), 1 field-specific course from the list below, and 2 elective courses.
    - The field specific course and the chosen electives must be approved by the supervisor(s).
    - All courses must be completed by the end of term 4.
    - Further courses may be required by the supervisor(s) in consultation with the Director of Biomedical Engineering Graduate Programs depending on the student's educational background.
    - Students who have completed the MASc program in BME at Waterloo may apply and continue to the doctoral program. In this situation, students will have already completed the core course requirements (one of BME 601, BME 602, or BME 603), a field-specific course and two electives as part of their master's degree requirements. To satisfy the PhD program requirements, these students must complete a total of four courses including a) one core course requirement (one of BME 601, BME 602 or BME 603 that was not completed as part of the MASc in BME program); b) two additional electives; c) an additional field-specific course if they have switched fields between MASc and PhD.
- Students admitted directly to the PhD program who possess an honour's undergraduate degree in biomedical engineering are required to complete a minimum of 7 courses (with 0.50 credits each), including 1 core BME course (BME 601, BME 602, BME 603), 2 field-specific courses from the list below, and 4 elective courses.
    - The field specific course and the chosen electives must be approved by the supervisor(s).
    - All courses must be completed by the end of term 5.
- Student must select their field-specific course(s) from the following list:
    - Biomaterials, Tissue Engineering and Drug Delivery
        - BIOL 636 Advanced Immunology
        - BME 611 Materials Biocompatibility
        - CHE 601 Theory and Application of Transport Phenomena
        - CHE 602 Chemical Reactor Analysis
        - CHE 612 Interfacial Phenomena
        - CHE 620 Applied Engineering Mathematics
        - CHE 640 Principles of Polymer Science
        - CHE 660 Principles of Biochemical Engineering
        - CHE 663 Bioseparations
        - CHE 760 Special Topics in Biochemical Engineering
        - ECE 601 Foundations of Biology in Engineering
        - KIN 657 Human Neuroanatomy
        - PHARM 609 Advanced Pharmacokinetics
        - PHARM 610 Topics in Drug Development
        - PHARM 617 Formulations
        - SYDE 684 Materials Biocompatibility
    - Biomechanics and Rehabilitation
        - AMATH 663 Fluid Mechanics
        - BME 550 Sports Engineering
        - BME 551 Biomechanics of Human Movement
        - BME 588 Special Topics in Biomechanics Topic 1: Mechanics of Biomaterials and Tissues
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 602 Respiratory and Cardiovascular Physiology
        - KIN 603 Cardiac and Vascular Smooth Muscle Physiology

        - KIN 611 Biomechanics of Human Motion
        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
        - KIN 620 Ergonomic Aspects of Occupational Musculoskeletal Injuries
        - ME 621 Applied Finite Element Methods
        - ME 662 Advanced Fluid Mechanics
        - ME 663 Computational Fluid Dynamics
        - ME 720 Special Topics in Solid Mechanics Topic 5: Impact Biomechanics
        - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
        - ME 780 Special Topics in Mechatronics Topic 37: Human Movement Neuromechanics
        - PHYS 752 Molecular Biophysics
        - SYDE 644 Human Factors Testing
        - SYDE 652 Dynamics of Multibody Systems
    - Biomedical Signals and Devices
        - ECE 730 Special Topics in Solid State Devices Topic 34: Biosensing – Fundamentals and Applications
        - ECE 770 Special Topics in Antenna and Microwave Theory Topic 4: Computational Methods for Engineering Electromagnetics
        - KIN 653 Human Neuroscience Theory
        - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
        - ME 739 Manufacturing Processes Topics Topic 3: Materials for Nano & Microelectromechanical Systems
        - ME 739 Manufacturing Processes Topics Topic 15: Additive Manufacturing Design
        - ME 765 Special Topics in Fluid Mechanics Topic 22: Microfluidic and MEMS Systems and Applications
        - ME 780 Special Topics in Mechatronics Topic 32: Neural and Rehabilitation Engineering
        - NANO 604 Nanomechanics and Molecular Dynamics Simulations
        - SYDE 750 Topics in Systems Modelling Topic 38: Social Robotics
    - Biomedical Imaging Technology
        - BME 641 Medical Imaging
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 613 Image Processing and Visual Communication
        - ECE 675 Radiation & Propagation of Electromagnetic Fields
        - ME 720 Special Topics in Solid Mechanics Topic 20: Acoustics
        - PHYS 751 Clinical Applications of Physics in Medicine
        - SYDE 671 Advanced Image Processing
        - SYDE 672 Statistical Image Processing
        - SYDE 675 Pattern Recognition
        - SYDE 677 Medical Imaging
        - SYDE 780 Selected Topics in Engineering Sciences Topic 13: Biomedical Optics
    - Biomedical Informatics
        - AMATH 882 Mathematical Cell Biology
        - BIOL 614 Applied Bioinformatics and Genomics
        - BME 651 Big Data Analysis: Health and Biomedical Engineering
        - HLTH 612 Data Structures and Standards in Health Informatics
        - HLTH 615 Requirements Specification and Analysis in Health Systems
        - HLTH 616 Decision Making and Systems Thinking in Health Informatics

        - HLTH 719 Advanced Research Methods in Health Data Science
        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
    - BME and health electives (general electives that include topics in more than one research fields)
        - ECE 603 Statistical Signal Processing
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 757A Embodied Intelligence
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 606 Molecular Basis of Disease
        - KIN 607 Integrative Energy Metabolism in Health and Disease
        - KIN 608 Introduction to Genetics for the Biosciences
        - KIN 612 Instrumentation and Signal Processing in Biophysical Research
        - KIN 646 Physiological and Biochemical Analysis of Nutrition and Health
        - KIN 653 Human Neuroscience Theory
        - KIN 654 Instrumentation in Neuroscience Research
        - MSE 619 Healthcare Analytics
        - SYDE 642 Cognitive Engineering Methods
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 37/32: Biology and Computation
        - SYDE 750 Topics in Systems Modelling Topic 39: Embodied Intelligence
    - 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 Director of the BME Graduate Program. 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.
    - 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 BME graduate program director and endorsement from the Associate Dean for Graduate Studies and Postdoctoral Affairs in the Faculty of Engineering.

Existing

Graduate Course Requirements

- Students are required to successfully complete 4 graduate-level courses (with unit weights of 0.50 each), including 1 core biomedical engineering course (BME 601, BME 602, or BME 603), 1 field-specific course from the list below, and 2 elective courses.
    - The field specific course and the chosen electives must be approved by the supervisor(s).
    - All courses must be completed by the end of term 4.
    - Further courses may be required by the supervisor(s) in consultation with the Director of Biomedical Engineering Graduate Programs depending on the student's educational background.
    - Students who have completed the MASc program in BME at Waterloo may apply and continue to the doctoral program. In this situation, students will have already completed the core course requirements (one of BME 601, BME 602, or BME 603), a field-specific course and two electives as part of their master's degree requirements. To satisfy the PhD program requirements, these students must complete a total of four courses including a) one core course requirement (one of BME 601, BME 602 or BME 603 that was not completed as part of the MASc in BME program); b) two additional electives; c) an additional field-specific course if they have switched fields between MASc and PhD.
- Students admitted directly to the PhD program who possess an honour's undergraduate degree in biomedical engineering are required to complete a minimum of 7 courses (with 0.50 credits each), including 2 core BME courses (BME 601, BME 602, BME 603), 1 field-specific course from the list below, and 4 elective courses.
    - The field specific course and the chosen electives must be approved by the supervisor(s).
    - All courses must be completed by the end of term 5.
- Student must select their field-specific course(s) from the following list:
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        - CHE 601 Theory and Application of Transport Phenomena
        - CHE 602 Chemical Reactor Analysis
        - CHE 612 Interfacial Phenomena
        - CHE 620 Applied Engineering Mathematics
        - CHE 640 Principles of Polymer Science
        - CHE 660 Principles of Biochemical Engineering
        - CHE 663 Bioseparations
        - CHE 760 Special Topics in Biochemical Engineering
        - ECE 601 Foundations of Biology in Engineering
        - KIN 657 Human Neuroanatomy
        - PHARM 609 Advanced Pharmacokinetics
        - PHARM 610 Topics in Drug Development
        - PHARM 617 Formulations
        - SYDE 684 Materials Biocompatibility
    - Biomechanics and Rehabilitation
        - AMATH 663 Fluid Mechanics
        - BME 550 Sports Engineering
        - BME 551 Biomechanics of Human Movement
        - BME 588 Special Topics in Biomechanics Topic 1: Mechanics of Biomaterials and Tissues
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 602 Respiratory and Cardiovascular Physiology
        - KIN 603 Cardiac and Vascular Smooth Muscle Physiology

        - KIN 611 Biomechanics of Human Motion
        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
        - KIN 620 Ergonomic Aspects of Occupational Musculoskeletal Injuries
        - ME 621 Applied Finite Element Methods
        - ME 662 Advanced Fluid Mechanics
        - ME 663 Computational Fluid Dynamics
        - ME 720 Special Topics in Solid Mechanics Topic 5: Impact Biomechanics
        - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
        - ME 780 Special Topics in Mechatronics Topic 37: Human Movement Neuromechanics
        - PHYS 752 Molecular Biophysics
        - SYDE 644 Human Factors Testing
    - Biomedical Signals and Devices
        - ECE 730 Special Topics in Solid State Devices Topic 34: Biosensing – Fundamentals and Applications
        - ECE 770 Special Topics in Antenna and Microwave Theory Topic 4: Computational Methods for Engineering Electromagnetics
        - KIN 653 Human Neuroscience Theory
        - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
        - ME 739 Manufacturing Processes Topics Topic 3: Materials for Nano & Microelectromechanical Systems
        - ME 739 Manufacturing Processes Topics Topic 15: Additive Manufacturing Design
        - ME 765 Special Topics in Fluid Mechanics Topic 22: Microfluidic and MEMS Systems and Applications
        - ME 780 Special Topics in Mechatronics Topic 32: Neural and Rehabilitation Engineering
        - NANO 604 Nanomechanics and Molecular Dynamics Simulations
        - SYDE 750 Topics in Systems Modelling Topic 38: Social Robotics
    - Biomedical Imaging Technology
        - BME 641 Medical Imaging
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 613 Image Processing and Visual Communication
        - ECE 675 Radiation & Propagation of Electromagnetic Fields
        - ME 720 Special Topics in Solid Mechanics Topic 20: Acoustics
        - PHYS 751 Clinical Applications of Physics in Medicine
        - SYDE 671 Advanced Image Processing
        - SYDE 672 Statistical Image Processing
        - SYDE 675 Pattern Recognition
        - SYDE 677 Medical Imaging
        - SYDE 780 Selected Topics in Engineering Sciences Topic 13: Biomedical Optics
    - Biomedical Informatics
        - AMATH 882 Mathematical Cell Biology
        - BIOL 614 Applied Bioinformatics and Genomics
        - BME 651 Big Data Analysis: Health and Biomedical Engineering
        - HLTH 612 Data Structures and Standards in Health Informatics
        - HLTH 615 Requirements Specification and Analysis in Health Systems
        - HLTH 616 Decision Making and Systems Thinking in Health Informatics
        - HLTH 719 Advanced Research Methods in Health Data Science

        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
    - BME and health electives (general electives that include topics in more than one research fields)
        - ECE 603 Statistical Signal Processing
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 606 Molecular Basis of Disease
        - KIN 607 Integrative Energy Metabolism in Health and Disease
        - KIN 608 Introduction to Genetics for the Biosciences
        - KIN 612 Instrumentation and Signal Processing in Biophysical Research
        - KIN 646 Physiological and Biochemical Analysis of Nutrition and Health
        - KIN 653 Human Neuroscience Theory
        - KIN 654 Instrumentation in Neuroscience Research
        - SYDE 642 Cognitive Engineering Methods
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 37/32: Biology and Computation
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 39/33: Embodied Intelligence
    - 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 Director of the BME Graduate Program. 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.
    - 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 BME graduate program director and endorsement from the Associate Dean for Graduate Studies and Postdoctoral Affairs in the Faculty of Engineering.

Milestone Requirements

Professional Attributes and Competence Enhancement (PACE) Module

- The PACE module milestone includes the following three components: Seminar series, PACE days, and Annual BME research day. The requirements for the three components are outlined below:
- Seminar series including presenting a research seminar:
    - Biweekly seminar series with students and internal and external BME speakers (1.5-hour duration). Guest speakers will also be invited to speak at the seminar series. The topics may be related to BME research, academic integrity, or professional development.
    - Each student must attend a minimum of five seminars per term, except for their final term. It is the student's responsibility to submit their "Seminar Attendance Certificates" attached to their term activity report. BME 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 enrolled as a full-time student in the program.
    - Each student will be required to present a research seminar by the end of their final term and as part of the PACE module milestones. BME will contact seminar candidates with scheduling information after they have passed their comprehensive exam (Parts I and II).
- PACE days:
    - Students are required to attend and participate in 2 PACE days at the beginning of terms 1, 2, 3, 4 and 5. PACE days are dedicated to students' professional development and the topics vary each term.
- Annual BME Research Day – once per year
    - Students are required to attend and present at the Annual BME Research Day. The annual event gives students an opportunity to showcase their progress and research findings while building community among BME graduate students. Students are required to submit an abstract and give either an oral or poster presentation.

PhD Comprehensive Examination I and Comprehensive Examination II

- 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.
    - Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup.
    - Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department.
    - Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements.
    - Academic integrity: Consistent with University-level minimum requirements.
- In addition to the University-level and Faculty-level PhD Comprehensive Examination minimum requirements, PhD students in the Biomedical Engineering graduate program are also required to meet the following requirements:
    - Students must successfully complete (pass) the Comprehensive Background Examination (Comprehensive Exam I (Background)) and the Comprehensive Proposal Examination (Comprehensive Exam II (Proposal) which are conducted by the Department for each candidate.
    - The first exam, the Comprehensive Background Examination, will be held before the end of the third term (fourth term if transferring from an incomplete MASc). The main objective of this examination is to satisfy the Department that the candidate has a broad knowledge of their field and a thorough technical background to pursue their research; the candidate will be questioned on their background preparation.
    - The second exam, the Comprehensive Proposal Examination, will be held no later than the student's sixth term and only after the Background Comprehensive Examination has been successfully completed. The main objective of this examination is to examine and approve the written thesis proposal.

- The result of these examinations is the identification of an Advisory Committee which has examined and approved the candidate's background and thesis proposal and is willing to assist the supervisor with the subsequent research program.
- Students who do not complete either Comprehensive Examination by the stated deadline, or fail either exam on their second attempt, will be required to withdraw from the program.
- It is the supervisor’s responsibility to assemble the advisory committee.

PhD Thesis

- Students may choose to pursue one (1) of the following Graduate Research Fields:
  - Biomaterials, Tissue Engineering, and Drug Delivery
  - Biomechanics and Rehabilitation
  - Biomedical Signals and Devices
  - Biomedical Imaging Technology
  - Biomedical Informatics
- Candidates are expected to attend annual meetings with their Advisory Committee and complete term reports to provide updates on their progress.
- 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 BME graduate program, 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.
- 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 program 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 defense.
- 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 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.

Notes

Workflow Information

Workflow Path	Faculty/AFIW Path(s) for Workflow	Senate Workflow
Committee approvals	Faculty of Engineering	--

Dependencies

Dependent Courses and Programs/Plans

There are no dependencies

MASc in Biomedical Engineering
Master of Applied Science (MASc) in Biomedical Engineering

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Thesis Option: Course Requirements
- Effective Term and Year

Effective Date and Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Fall 2025

Proposal Details

Proposal Type
Change

Academic Unit Approval
2025/05/21

Quality Assurance Designation
Minor Modification

Is there an impact to existing students?
Yes

Impact on Existing Students
Registered students will be allowed to count these courses as part of their field-specific course requirement.

Is the credential name changing?
No

Graduate Co-operative Requirements
Not Applicable

Change to Learning Outcomes
No

Rationale and Background for Change(s)
Adding SYDE 652, MSE 619, and ECE 757A to the field-specific course requirements list. Removing ECE 750 Topic 33 from the field-specific course requirements list: We are requesting to add two courses to the field-specific course requirement. These courses relate to our five fields, and therefore students who take these courses should have them count towards their field-specific course requirement. We are also requesting to add ECE 757A and remove ECE 750 Topic 33 as ECE 757A was created in place of ECE 750 Topic 33. Therefore, ECE 757A will be offered and ECE 750 Topic 33 will no longer be offered.

Consultations (Departmental)

Supporting Documentation

General Program/Plan Information

Faculty
Faculty of Engineering

Academic Unit
Dean of Engineering Office

Graduate Field of Study
Biomedical Engineering

Faculty
Faculty of Engineering

Program/Plan Name
Master of Applied Science (MASc) in Biomedical Engineering

Graduate Credential Type
Master's

Accelerated Program
Not applicable

Study Options (New)
Thesis

Program Types

Admit Term(s)

Fall
Winter
Spring

Delivery Mode

On-campus

Delivery Mode Information

Length of Program

- Students are required to complete the program in accordance with the University program time limits.

Registration Option(s)

Full-time

Registration Options Information

Graduate Research Fields

- Biomaterials, Tissue Engineering, and Drug Delivery
- Biomechanics and Rehabilitation
- Biomedical Signals and Devices
- Biomedical Imaging Technology
- Biomedical Informatics

Graduate Specializations

Additional Program Information

Admissions

Admission Requirements: Minimum Requirements

- MASc applicants must have completed a bachelor's degree (or equivalent) in any field of engineering or a related science discipline at a recognized institution with a minimum 80% overall average.
- Applicants who are deemed by the graduate coordinator, Biomedical Engineering (BME) graduate program director, Admissions Committee or intended advisor to have an inadequate depth of technical BME background may be directed to take additional foundational courses, to be specified at the time of admission.
- English language proficiency (ELP) (if applicable)

Admission Requirements: Application materials

- Résumé
- Supplementary information form
- Transcript(s)

Admission Requirements: References

- Number of references: 2
- Type of references: Academic. Applicants who completed their degree five or more years before the application date may submit 1 academic and 1 professional reference.

Requirements Information

Graduate Degree Requirements

- Students must complete the course and milestone requirements listed below in addition to the Graduate Academic Integrity Module (Graduate AIM).

Thesis Option: Course Requirements

No Rules

Proposed

Thesis Option: Course Requirements

- Students must complete the following 4 graduate level courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo:
    - 1 of the following Biomedical Engineering core courses:
        - BME 601 Physiological Systems and Biomedical Design
        - BME 602 Foundations in Biomechanical Engineering
        - BME 603 Engineering Analysis of Living Cells
    - 1 of the following field-specific courses:
        - Biomaterials, Tissue Engineering and Drug Delivery
            - BIOL 636 Advanced Immunology
            - BME 611 Materials Biocompatibility
            - CHE 601 Theory and Application of Transport Phenomena
            - CHE 602 Chemical Reactor Analysis
            - CHE 612 Interfacial Phenomena
            - CHE 620 Applied Engineering Mathematics
            - CHE 640 Principles of Polymer Science
            - CHE 660 Principles of Biochemical Engineering
            - CHE 663 Bioseparations
            - CHE 760 Special Topics in Biochemical Engineering
            - ECE 601 Foundations of Biology in Engineering
            - KIN 657 Human Neuroanatomy
            - PHARM 609 Advanced Pharmacokinetics
            - PHARM 610 Topics in Drug Development
            - PHARM 617 Formulations
            - SYDE 684 Materials Biocompatibility
        - Biomechanics and Rehabilitation
            - AMATH 663 Fluid Mechanics
            - BME 550 Sports Engineering
            - BME 551 Biomechanics of Human Movement
            - BME 588 Special Topics in Biomechanics Topic 1: Mechanics of Biomaterials and Tissues
            - KIN 601 Skeletal Muscle Physiology: Structure & Function
            - KIN 602 Respiratory and Cardiovascular Physiology
            - KIN 603 Cardiac and Vascular Smooth Muscle Physiology
            - KIN 611 Biomechanics of Human Motion
            - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
            - KIN 620 Ergonomic Aspects of Occupational Musculoskeletal Injuries
            - ME 621 Applied Finite Element Methods
            - ME 662 Advanced Fluid Mechanics
            - ME 663 Computational Fluid Dynamics
            - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
            - ME 720 Special Topics in Solid Mechanics Topic 5: Impact Biomechanics
            - ME 780 Special Topics in Mechatronics Topic 37: Human Movement Neuromechanics
            - PHYS 752 Molecular Biophysics
            - SYDE 644 Human Factors Testing
            - SYDE 652 Dynamics of Multibody Systems
        - Biomedical Signals and Devices
            - ECE 730 Special Topics in Solid State Devices Topic 34: Biosensing – Fundamentals and Applications
            - ECE 770 Special Topics in Antenna and Microwave Theory Topic 4: Computational Methods for Engineering Electromagnetics
            - KIN 653 Human Neuroscience Theory
            - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices

        - ME 739 Manufacturing Processes Topics Topic 3: Materials for Nano & Microelectromechanical Systems
        - ME 739 Manufacturing Processes Topics Topic 15: Additive Manufacturing Design
        - ME 765 Special Topics in Fluid Mechanics Topic 22: Microfluidic and MEMS Systems and Applications
        - ME 780 Special Topics in Mechatronics Topic 32: Neural and Rehabilitation Engineering
        - NANO 604 Nanomechanics and Molecular Dynamics Simulations
        - SYDE 750 Topics in Systems Modelling Topic 38: Social Robotics
      - Biomedical Imaging Technology
        - BME 641 Medical Imaging
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 613 Image Processing and Visual Communication
        - ECE 675 Radiation & Propagation of Electromagnetic Fields
        - ME 720 Special Topics in Solid Mechanics Topic 20: Acoustics
        - PHYS 751 Clinical Applications of Physics in Medicine
        - SYDE 671 Advanced Image Processing
        - SYDE 672 Statistical Image Processing
        - SYDE 675 Pattern Recognition
        - SYDE 677 Medical Imaging
        - SYDE 780 Selected Topics in Engineering Sciences Topic 13: Biomedical Optics
      - Biomedical Informatics
        - AMATH 882 Mathematical Cell Biology
        - BIOL 614 Applied Bioinformatics and Genomics
        - BME 651 Big Data Analysis: Health and Biomedical Engineering
        - HLTH 612 Data Structures and Standards in Health Informatics
        - HLTH 615 Requirements Specification and Analysis in Health Systems
        - HLTH 616 Decision Making and Systems Thinking in Health Informatics
        - HLTH 719 Advanced Research Methods in Health Data Science
        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
      - BME and health electives (general electives that include topics in more than one research fields)
        - ECE 603 Statistical Signal Processing
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 757A Embodied Intelligence
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 606 Molecular Basis of Disease
        - KIN 607 Integrative Energy Metabolism in Health and Disease
        - KIN 608 Introduction to Genetics for the Biosciences
        - KIN 612 Instrumentation and Signal Processing in Biophysical Research
        - KIN 646 Physiological and Biochemical Analysis of Nutrition and Health
        - KIN 653 Human Neuroscience Theory
        - KIN 654 Instrumentation in Neuroscience Research
        - MSE 619 Healthcare Analytics
        - SYDE 642 Cognitive Engineering Methods
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 37/32: Biology and Computation
        - SYDE 750 Topics in Systems Modelling Topic 39: Embodied Intelligence
    - 2 elective courses
- All courses must be completed by the end of term 4.
- All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Director or Associate Director, BME graduate program. 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 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 BME graduate program director and endorsement from the Associate Dean for Graduate Studies and Postdoctoral Affairs in the Faculty of Engineering.

Existing

Thesis Option: Course Requirements

- Students must complete the following 4 graduate level courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo:
    - 1 of the following Biomedical Engineering core courses:
        - BME 601 Physiological Systems and Biomedical Design
        - BME 602 Foundations in Biomechanical Engineering
        - BME 603 Engineering Analysis of Living Cells
    - 1 of the following field-specific courses:
        - Biomaterials, Tissue Engineering and Drug Delivery
            - BIOL 636 Advanced Immunology
            - BME 611 Materials Biocompatibility
            - CHE 601 Theory and Application of Transport Phenomena
            - CHE 602 Chemical Reactor Analysis
            - CHE 612 Interfacial Phenomena
            - CHE 620 Applied Engineering Mathematics
            - CHE 640 Principles of Polymer Science
            - CHE 660 Principles of Biochemical Engineering
            - CHE 663 Bioseparations
            - CHE 760 Special Topics in Biochemical Engineering
            - ECE 601 Foundations of Biology in Engineering
            - KIN 657 Human Neuroanatomy
            - PHARM 609 Advanced Pharmacokinetics
            - PHARM 610 Topics in Drug Development
            - PHARM 617 Formulations
            - SYDE 684 Materials Biocompatibility
        - Biomechanics and Rehabilitation
            - AMATH 663 Fluid Mechanics
            - BME 550 Sports Engineering
            - BME 551 Biomechanics of Human Movement
            - BME 588 Special Topics in Biomechanics Topic 1: Mechanics of Biomaterials and Tissues
            - KIN 601 Skeletal Muscle Physiology: Structure & Function
            - KIN 602 Respiratory and Cardiovascular Physiology
            - KIN 603 Cardiac and Vascular Smooth Muscle Physiology
            - KIN 611 Biomechanics of Human Motion
            - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
            - KIN 620 Ergonomic Aspects of Occupational Musculoskeletal Injuries
            - ME 621 Applied Finite Element Methods
            - ME 662 Advanced Fluid Mechanics
            - ME 663 Computational Fluid Dynamics
            - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
            - ME 720 Special Topics in Solid Mechanics Topic 5: Impact Biomechanics
            - ME 780 Special Topics in Mechatronics Topic 37: Human Movement Neuromechanics
            - PHYS 752 Molecular Biophysics
            - SYDE 644 Human Factors Testing
        - Biomedical Signals and Devices
            - ECE 730 Special Topics in Solid State Devices Topic 34: Biosensing – Fundamentals and Applications
            - ECE 770 Special Topics in Antenna and Microwave Theory Topic 4: Computational Methods for Engineering Electromagnetics
            - KIN 653 Human Neuroscience Theory
            - ME 720 Special Topics in Solid Mechanics Topic 4: Mechanics of Medical Devices
            - ME 739 Manufacturing Processes Topics Topic 3: Materials for Nano &

Microelectromechanical Systems
        - ME 739 Manufacturing Processes Topics Topic 15: Additive Manufacturing Design
        - ME 765 Special Topics in Fluid Mechanics Topic 22: Microfluidic and MEMS Systems and Applications
        - ME 780 Special Topics in Mechatronics Topic 32: Neural and Rehabilitation Engineering
        - NANO 604 Nanomechanics and Molecular Dynamics Simulations
        - SYDE 750 Topics in Systems Modelling Topic 38: Social Robotics
    - Biomedical Imaging Technology
        - BME 641 Medical Imaging
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 613 Image Processing and Visual Communication
        - ECE 675 Radiation & Propagation of Electromagnetic Fields
        - ME 720 Special Topics in Solid Mechanics Topic 20: Acoustics
        - PHYS 751 Clinical Applications of Physics in Medicine
        - SYDE 671 Advanced Image Processing
        - SYDE 672 Statistical Image Processing
        - SYDE 675 Pattern Recognition
        - SYDE 677 Medical Imaging
        - SYDE 780 Selected Topics in Engineering Sciences Topic 13: Biomedical Optics
    - Biomedical Informatics
        - AMATH 882 Mathematical Cell Biology
        - BIOL 614 Applied Bioinformatics and Genomics
        - BME 651 Big Data Analysis: Health and Biomedical Engineering
        - HLTH 612 Data Structures and Standards in Health Informatics
        - HLTH 615 Requirements Specification and Analysis in Health Systems
        - HLTH 616 Decision Making and Systems Thinking in Health Informatics
        - HLTH 719 Advanced Research Methods in Health Data Science
        - KIN 613 Modern Methods in Biomechanical Modeling, Kinematics, and Kinetics
    - BME and health electives (general electives that include topics in more than one research fields)
        - ECE 603 Statistical Signal Processing
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - KIN 601 Skeletal Muscle Physiology: Structure & Function
        - KIN 606 Molecular Basis of Disease
        - KIN 607 Integrative Energy Metabolism in Health and Disease
        - KIN 608 Introduction to Genetics for the Biosciences
        - KIN 612 Instrumentation and Signal Processing in Biophysical Research
        - KIN 646 Physiological and Biochemical Analysis of Nutrition and Health
        - KIN 653 Human Neuroscience Theory
        - KIN 654 Instrumentation in Neuroscience Research
        - SYDE 642 Cognitive Engineering Methods
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 37/32: Biology and Computation
        - SYDE/ECE 750 Topics in Systems Modelling/Special Topics in Computer Software Topic 39/33: Embodied Intelligence
  - 2 elective courses
- All courses must be completed by the end of term 4.
- All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Director or Associate Director, BME graduate program. 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 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 BME graduate program director and endorsement from the Associate Dean for Graduate Studies and Postdoctoral Affairs in the Faculty of Engineering.

Thesis Option: Milestone Requirements

Professional Attributes and Competence Enhancement (PACE) Module

- The PACE module milestone includes the following three components: a Seminar series, PACE days, and Annual BME research day. The requirements for the three components are outlined below:
- Seminar series including presenting a research seminar:
    - Biweekly seminar series with students and internal and external BME speakers (1.5-hour duration). Guest speakers will also be invited to speak at the seminar series. The topics may be related to BME research, academic integrity, or professional development.
    - Each student must attend a minimum of five seminars per term, except for their final term. It is the student's responsibility to submit their "Seminar Attendance Certificates" attached to their term activity report. BME 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 enrolled as a full-time student in the program.
    - Each student will be required to present a research seminar by the end of their final term and as part of the PACE module milestones. BME will contact seminar candidates with scheduling information after they have passed their proposal.
- PACE Days:
    - Students are required to attend and participate in 2 PACE days at the beginning of terms 1, 2, and 3. PACE days are dedicated to students' professional development and the topics vary each term.
- Annual BME Research Day – once per year
    - Students are required to attend and present at the Annual BME Research Day. The annual event gives students an opportunity to showcase their progress and research findings while building community among BME graduate students. Students are required to submit an abstract and give either an oral or poster presentation.

Master's Thesis Proposal

- Students must develop and defend a thesis proposal that will be examined and approved by their supervisor and committee. The thesis proposal must be completed by the end of term 3.

Master's Thesis

- Students may choose to pursue one (1) of the following Graduate Research Fields:
    - Biomaterials, Tissue Engineering, and Drug Delivery
    - Biomechanics and Rehabilitation
    - Biomedical Signals and Devices
    - Biomedical Imaging Technology
    - Biomedical Informatics
- 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 BME graduate program, 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.
- Upon approval of the thesis proposal, students will proceed to the research and writing of the thesis. Students must complete and orally defend the thesis by the end of term 6. The thesis and defence will be evaluated by the student's Advisory Committee. The Advisory Committee shall be comprised of: at least one tenured or tenure track faculty member from the BME graduate program who will normally be the student's supervisor(s); an additional tenured or tenure track BME graduate faculty member; and at least one additional examiner who is not a BME faculty member (but may be from a department with BME faculty members) and whose expertise can support the evaluation of the Master's thesis. Consistent with the Faculty of Engineering requirements, a maximum of one committee member with an adjunct appointment or emeritus status is permitted.

Notes

Workflow Information

Workflow Path	Faculty/AFIW Path(s) for Workflow	Senate Workflow
Committee approvals	Faculty of Engineering	--

Dependencies

Dependent Courses and Programs/Plans

There are no dependencies

FACULTY OF ENVIRONMENT - GRADUATE STUDIES COMMITTEE

REPORT TO SENATE GRADUATE COUNCIL

October 2025

1. Program Revision
    a. *Master of Environmental Studies (MES) in Social and Ecological Sustainability, Master of Environmental Studies (MES) in Social and Ecological Sustainability – Internship, Master of Environmental Studies (MES) in Social and Ecological Sustainability – Water: Changing elective course component for MES – MRP; updating cross-listing*

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: Environment

Programs: 1) Master of Environmental Studies (MES) in Social and Ecological Sustainability

2) Master of Environmental Studies (MES) in Social and Ecological Sustainability – Internship

3) Master of Environmental Studies (MES) in Social and Ecological Sustainability – Water

Program contact name(s): Andrea M. Collins, Stephanie Mohl

Form completed by: Stephanie Mohl

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

- *Changing the elective course component for the MES – Master's Research Paper Option so that only 1 course elective must be from the School of Environment, Resources and Sustainability. Students will still take the same total number of courses (six).*
- *Making a minor change to reflect the recent crosslisting of ERS 669 with GEOG 617. This update applies to all the MES in Social and Ecological Sustainability programs/options.*

Is this a major modification to the program? No

Rationale for change(s):

- *This change will allow students to choose from a wider scope of courses and will also allow them to make course selections more appropriate to their research and/or career intentions.*
- *This change better aligns the expectations of the MRP Option with the Thesis Option.*
- *This change will also enable more flexibility in the program, including the introduction of topic specializations.*
- *Encourages students to take other courses in the Faculty of Environment.*

Proposed effective date: Term: Winter Year: 2026

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

https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/programs/SygTxJC0ih

https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/programs/S1TxJR0j2

https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/programs/BkeTxJC0jh

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

MES in Social and Ecological Sustainability
 	
Master's Research Paper option: Course requirements
 	
• Required courses
  ○ ERS 680 Sustainability Foundations (Fall)
  ○ ERS 681 Sustainability Applications (Winter)
  ○ One of: ERS 669 Applied Statistics in Ecology and Environment or ERS 625/GEOG 625 Qualitative Methods in Geography (Winter)
• Elective courses
  ○ Students must complete 3 elective graduate courses.
  ○ At least ~~2~~ of the electives must be from the School of Environment, Resources and Sustainability.
• Students must maintain an academic average of at least 75%.
 	
MES in Social and Ecological Sustainability
MES in Social and Ecological Sustainability – Internship
MES in Social and Ecological Sustainability – Water
 	
Course requirements
 	
ERS 669 Applied Statistics in Ecology and Environment
	MES in Social and Ecological Sustainability
	
	Master's Research Paper option: Course requirements
	
	• Required courses
	  ○ ERS 680 Sustainability Foundations (Fall)
	  ○ ERS 681 Sustainability Applications (Winter)
	  ○ One of: ERS 669/GEOG 617 Applied Statistics in Ecology and Environment or ERS 625/GEOG 625 Qualitative Methods in Geography (Winter)
	• Elective courses
	  ○ Students must complete 3 elective graduate courses.
	  ○ At least **1** of the electives must be from the School of Environment, Resources and Sustainability.
	• Students must maintain an academic average of at least 75%.
	
	MES in Social and Ecological Sustainability
	MES in Social and Ecological Sustainability – Internship
	MES in Social and Ecological Sustainability – Water
	
	Course requirements
	
	ERS 669/GEOG 617 Applied Statistics in Ecology and Environment

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

Some students already registered in the program have already been permitted to take electives outside of the School of Environment, Resources and Sustainability. Students already in the program may request this if they prefer.

Department/School approval date (mm/dd/yy): 04/22/25
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 05/28/25
Faculty approval date (mm/dd/yy): 09/18/25
Senate Graduate Council (SGC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Science Faculty Council Meeting, June 24th, 2025

Graduate Studies Motions

Motion from Pharmacy

1. To approve a new graduate course, PHARM 659 - Mechanisms of Drug Action

Brief rationale: The course will fill a gap in the School of Pharmacy's course offerings with respect to basic pharmacology, and it will also be a key elective for the School of Pharmacy's course-based Master's program as well as other course-based Master's programs being developed in the Faculty of Science. The course will also be available to graduate students in Biology, Chemistry, and in other Faculties such as Health and Engineering.

Motion from Physics and Astronomy

1. To approve changing the format of the PhD comprehensive examination to include a written and oral examination of a research thesis proposal.

Brief rationale: Provide students with experience in writing and defending research proposals. Provide a formal preview of what the student might be able to achieve for a thesis.

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: Science

Effective date: Term: Winter Year: 2026

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: PHARM

Course number: 659

Course ID:

Course title (max. 100 characters including spaces): Mechanisms of Drug Action

Course short title (max. 30 characters including spaces): Mechanisms of Drug Action

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Instructor

Course description: The course will explore mechanisms of drug action including efficacy, toxicity, and related topics such as dosage forms, routes of administration, pharmacokinetics, drug interactions, and pharmacogenetics. Major classes of drugs and drug targets will be explored including G protein-coupled receptors, ion channels, kinases and enzymes, and biologics. This knowledge will be applied to common cardiovascular, pulmonary, endocrine, neurological, and psychiatric disease states, as well as oncology and auto-immune conditions. Methods in preclinical and clinical drug development will be explored using the primary

literature.

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

Primary meet type: Tutorial

Delivery mode: On-campus and also offered online

Requisites: n/a

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:

There is a gap in the School of Pharmacy's course offerings with respect to basic pharmacology and this proposed course will fill this gap. The course is also designed to be flexible enough to accommodate Pharmacy graduate students from different backgrounds and disciplines. The course will also be valuable to two additional groups of students. Thesis-based graduate students in Biology, Chemistry, and in other Faculties such as Health and Engineering will benefit from this course. In addition, the course will become a key elective for the School of Pharmacy's course-based Master's program as well as other course-based Master's programs being developed in the Faculty of Science.

The challenge in designing a graduate course flexible enough to meet the needs of graduate students across different programs will be addressed via the three main components to the course: the basic pharmacology and types of drug classes as well as the systems pharmacology approach will be fairly generic and accessible to students with diverse backgrounds. The third component, exploring the primary literature in a "journal club" format, will allow for a more rigourous focus on pharmacology topics and areas tailored to the specific interests and backgrounds of students in the class.

Form completed by: Michael Beazely
Department/School approval date (mm/dd/yy): 05/29/2025
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 05/09/25
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: Science

Programs: 1) Doctor of Philosophy (PhD) in Physics
2) Doctor of Philosophy (PhD) in Physics - Nanotechnology
3) Doctor of Philosophy (PhD) in Physics - Quantum Information

Program contact name(s): Jan Kycia, Associate Chair, Graduate Studies, Department of Physics and Astronomy

Form completed by: Sophie Gagnon and Jan Kycia

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

Changing the format of the PhD comprehensive examination from a written and oral examination of questions on assigned reading material to an oral examination of a written research thesis proposal and student background knowledge in their research discipline.

Is this a major modification to the program? No

Rationale for change(s):

The existing format of the comprehensive examination is designed to assess the student's knowledge of the fundamentals and applications of the physics closely related to the thesis topic.

The new format, including a written and oral evaluation, continues to allow for this assessment. In addition, there is also the opportunity to:

- *Test the written as well as oral communication abilities of the student.*
- *Provide a formal preview of what the student might be able to achieve for a thesis.*
- *Provide students with experience in writing research proposals.*

Proposed effective date: Term: Winter Year: 2026

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/science/department-physics-and-astronomy/doctor-philosophy-phd-physics

https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/programs/HkbfZJRRi2

https://uwaterloo.ca/academic-calendar/graduate-studies/catalog#/programs/BkXfZJ0Csh

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
PhD Comprehensive Examination	**PhD Comprehensive Examination**

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

• 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 exceptions that are specific to the PhD in Physics program:
  ○ Committee composition: Consistent with University-level minimum requirements with the exception that two examiners must not be the student's supervisor(s). At least one examiner must be a regular faculty member of the Department of Physics and Astronomy. At least two (one for PhD students supervised by a Perimeter Institute faculty member) examiners must hold regular faculty appointments at University of Waterloo.
 	
• In addition to the University-level PhD Comprehensive Examination minimum requirements, students in the PhD in Physics program are also required to follow the requirements outlined below:
  ○ ~~The examination will assess the student's knowledge of the fundamentals and applications of the physics closely related to the thesis topic.~~
  ○ ~~A student's comprehensive exam includes both written and oral components. These components are evaluated by an examining committee constituted for a given student. The examining committee will consist of at least three expert examiners, in accordance with university guidelines. The nonvoting Chair will normally be the program Director or their designate. The Associate Director from the University of Guelph or his/her designate may attend the exam either as an expert examiner or a non-expert examiner.~~
  ○ ~~The student's advisory committee will meet formally with the student during the first year of the PhD program. From this meeting, a list of three areas of physics deemed necessary background for the thesis topic will result and be recorded on the Committee meeting form along with the names of three~~
	• 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 exceptions that are specific to the PhD in Physics program:
	
	• In addition to the University-level PhD Comprehensive Examination minimum requirements, students in the PhD in Physics program are also required to follow the requirements outlined below:
	• The purpose of the exam is to assess if the student:
	  ○ has the capacity to engage in and communicate scholarly work necessary to be successful in their PhD studies,
	  ○ can describe the research topic for their thesis that is feasible and sufficiently novel to warrant a PhD in Physics,
	  ○ has sufficient understanding of the background knowledge required to successfully complete a PhD in their field of study.
	• The comprehensive exam will have two components: a written research proposal and an oral defense of the proposal. Both the written proposal and oral defense will be evaluated by the comprehensive examining committee.
	• During the first committee meeting, the student's advisory committee will provide guidance to the student regarding the expected content of the written research proposal (topics covered in the main text and appendices).
	• Written proposal - Students must prepare a written proposal that includes:
	  ○ Summary (300 words): Provide a summary of the proposal in language that a general physics audience can understand. Using simple terms, briefly describe the nature of the work to be done. Indicate why and to whom the research is important and the anticipated outcomes.
	  ○ Proposal (maximum 10 pages including figures and tables (excluding references and appendices), 12pt font, single-spaced). The proposal is to include the following sections:
	  ▪ Primary goal and specific aims of the research project.

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
~~expert examiners. At the committee meeting, the committee members will specify the level of knowledge expected in each area (eg at the level of the original research literature, review articles or graduate level textbooks). Examiners are encouraged to give to the student explicit examples of references which illustrate the level and knowledge expected.~~ ~~○ Once the exam date has been scheduled, each of the three expert members of the committee with knowledge of the designated areas, will be asked to set 3 exam questions, each requiring approximately 10 minutes to answer. Along with their questions, the expert examiners will also submit an outline of the answers they expect for their respective questions; this will not only ensure that the questions are of the right length but will also be of help to the non-expert committee member(s) during the exam. Sufficient collaboration should occur among expert examiners to avoid excessive duplication of exam questions.~~ ~~○ The Chair of the exam (Director or his/her designate) will vet and approve the questions and may request edits to remove overlaps or improve the clarity of questions and/or solutions. All examiners will proofread the final exam. The oral exam is intended to be approximately 90 minutes long but may run longer, if necessary. All questions will normally be covered.~~ ~~○ The student will have access to the exam in an examination room for up to two hours with a calculator and paper provided to them (if the student so desires) prior to the start of the formal oral examination period. No books or other aids are permitted.~~ ~~○ In the oral portion of the exam, the student may choose the first question for which he/she will present a solution; the exam will then proceed in the established question order from question 1). Solutions to questions will be presented to the examination committee one at a time without interruption. The examination committee will ask questions and/or provide feedback only after the student~~	▪ Background Information: Discuss the literature and background information pertinent to the proposal. ▪ Methodology: Describe the methods and proposed approach, providing sufficient details to allow the committee to assess the feasibility of the research activities. ▪ Impact: Explain the significance of the anticipated results. ▪ Provide a timeline for completion of tasks. Explain what needs to be completed to satisfy the research requirement for the PhD. • The written proposal will be submitted to the Graduate Coordinator 2 weeks before the date of the oral defense, for distribution to the comprehensive examining committee. • Oral defense of the Proposal - The student must give a 30-minute presentation of their proposal. This will be followed by 2 rounds of questions from three members of the comprehensive examining committee (approximately 10 minutes for each round). These questions will aim to assess the viability of the research project, as well as the background knowledge of the student. The oral defense should last a maximum of 1.5 hours. The oral defense of the proposal will be public. • Outcomes of the comprehensive examination are consistent with the University-level minimum requirements

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
~~has completed his/her presentation of a given question. The student will be assessed separately on the presentation and discussion components of each question and a combined grade will also be recorded by each examiner.~~ ~~○ The candidate will leave the room while the committee discusses the grades given. The most recent report of the advisory committee and the student's grades in graduate courses will be available to the committee for its deliberations after the examination is finished. Discussion of the candidate's responses to individual questions is expected before arriving at a final recommendation on the outcome of the exam. The result is communicated verbally to the candidate once the decision has been made and is followed by written confirmation, usually within 24 hours.~~ ~~○ In the case of a conditional pass, the conditions specified may be aimed at improving a weakness in understanding of one or more of the three areas of the exam.~~ ~~○ Since the oral portion of the exam immediately follows the written part and involves a presentation by the candidate of the written responses to questions, suspected violations of academic integrity during the written exam should be reported to the Chair of the exam who will normally allow the oral portion of the exam to proceed and the potential academic integrity violation will be vetted after the completion of the exam.~~	

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

Students enrolled under the previous exam requirements would be given the choice of which format of exam to take.

Department/School approval date (05/09/25):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 05/28/25
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

SGC - Regular Agenda - Faculty of Engineering - October 23, 2025

Meeting Information

Agenda Page Title
SGC - Regular Agenda - Faculty of Engineering - October 23, 2025

Career Level
Graduate

Faculty/Unit
Engineering

Date
2025/10/23

Time

Location

Summary

Program Changes:

1) Electrical and Computer Engineering:

Doctor of Philosophy (PhD) in Electrical and Computer Engineering:
1.1) *Updating and re-organizing the ECE research fields and updating the wording in the course requirements section. Also updating the list of core courses associated with each research field.*
Master of Applied Science (MASc) in Electrical and Computer Engineering:
1.2) Updating and re-organizing the ECE research fields and updating the wording in the course requirements section. Also updating the list of core courses associated with each research field.

Other Business

Attachment(s)

Course Proposals

Course Proposal Details

Courses: Retire
No proposals have been added.

Courses: New
No proposals have been added.

Courses: Changes

No proposals have been added.

Programs & Plans Proposals

Programs & Plans Proposal Details

Programs & Plans: Retire

No proposals have been added.

Programs & Plans: Major Modifications

Code	Title	Type	Workflow Step
PhD in Electrical & Computer Engineering	Doctor of Philosophy (PhD) in Electrical and Computer Engineering	Program	SGC, Senate Graduate Council (SGC) | Under Review
MASc in Electrical & Computer Engineering	Master of Applied Science (MASc) in Electrical and Computer Engineering	Program	SGC, Senate Graduate Council (SGC) | Under Review

Programs & Plans: Minor Modifications

No proposals have been added.

Regulations Proposals

Regulations Proposal Details

Regulations: Retire

No proposals have been added.

Regulations: New

No proposals have been added.

Regulations: Changes

No proposals have been added.

PhD in Electrical & Computer Engineering
Doctor of Philosophy (PhD) in Electrical and Computer Engineering

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Graduate Course Requirements
- Graduate Research Fields
- Effective Term and Year
- Admin Notes

Effective Date and Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Fall 2024

Proposal Details

Proposal Type
Change

Academic Unit Approval
2025/01/23

Quality Assurance Designation
Major Modification

Major Modification Categories
Add/re-name a graduate research field, graduate specialization, honours, option, specialization, undergraduate diploma, minor
Closure of a graduate research field, graduate specialization, honours, option, specialization, undergraduate diploma, minor

Is there an impact to existing students?
No

Is the credential name changing?
No

Graduate Co-operative Requirements
Not Applicable

Change to Learning Outcomes
No

Rationale and Background for Change(s)
Update and re-organize the ECE research fields and cleanup wording in the course requirements section: The research fields in ECE have remained unchanged for a long time. This update modernizes their names to reflect recent advancements and consolidates them for greater clarity.
Additionally, this revision updates the list of core courses associated with each research field. All ECE PhD students must pass at least two courses from the list of core courses for their designated research field, as specified in their letter of admission (unless this requirement was achieved during their MASc).

Consultations (Departmental)

Supporting Documentation

General Program/Plan Information

Faculty
Faculty of Engineering

Academic Unit
Department of Electrical and Computer Engineering

Graduate Field of Study
Electrical and Computer Engineering

Faculty
Faculty of Engineering

Program/Plan Name
Doctor of Philosophy (PhD) in Electrical and Computer Engineering

Graduate Credential Type
PhD

Accelerated Program
Not applicable

Program Types

Admit Term(s)
Fall
Winter
Spring

Delivery Mode
On-campus

Delivery Mode Information

Length of Program

- The minimum period of registration for the Doctoral degree is four terms after a Master’s degree or equivalent and six terms after an Honours Bachelor's degree or equivalent. The maximum time limit is twelve terms after a Master’s degree or equivalent and eighteen terms after an Honours Bachelor's degree or equivalent. Extensions beyond twelve terms must be approved by the Faculty Graduate Studies Office.

Registration Option(s)
Full-time
Part-time

Registration Options Information

Proposed

Graduate Research Fields

- Applied Electromagnetics and Photonics
- Artificial Intelligence
- Biomedical Engineering
- Communications and Information Systems
- Computer Hardware
- Computer Software and Systems
- Control, Robotics, and Autonomous Systems
- Integrated Devices, Circuits and Systems
- Nanoengineering
- Power and Energy Systems
- Quantum Engineering

Existing

Graduate Research Fields

- Antennas, Microwaves and Wave Optics
- Biomedical
- Circuits and Systems Including Computer - Aided Design
- Communications and Information Systems
- Computer Hardware
- Computer Software
- Nanotechnology
- Pattern Analysis and Machine Intelligence (PAMI)
- Power and Energy Systems
- Quantum Information
- Silicon Devices and Integrated Circuits
- Systems and Control
- Very Large Scale Integration (VLSI)
- Wireless Communication

Graduate Specializations

Additional Program Information

Admissions

Admission Requirements: Minimum Requirements

- Admission to the program is based upon the student's academic record and evidence of ability to pursue independent research.
- Normally an overall standing equivalent to 80% in either a relevant thesis-based Master’s degree or a University of Waterloo Master of Engineering (MEng) degree that includes a completed ECE 699A Master of Engineering Project 1 course.
- At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission.
- English language proficiency (ELP) (if applicable)

Admission Requirements: Application materials

- Résumé
- Supplementary information form
- Transcript(s)

Admission Requirements: References

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

Requirements Information

Graduate Degree Requirements

- Students must complete the course and milestone requirements listed below in addition to the Graduate Academic Integrity Module (Graduate AIM).

Graduate Course Requirements

No Rules

Proposed

Graduate Course Requirements

- The coursework associated with the program is intended to provide a foundation for advanced learning in the chosen field of research.
- Students holding a Master of Applied Science (MASc) degree or equivalent must obtain at least 4 courses (0.50 unit weight per course) of graduate credit (7 0.50 unit weight courses from a Bachelor program).
- At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved research fields as specified at the time of the student's admission, unless this requirement has already been achieved during a University of Waterloo Electrical and Computer Engineering MASc program.
- A minimum of 2 courses must be taken from within the Department of Electrical & Computer Engineering. Core courses may count towards this 2 course minimum.
- The remaining 2 courses may be taken from outside of the Department but must be from the faculties of Engineering, Mathematics, and/or Science (unless otherwise approved).
- The choice of courses must meet with the approval of the supervisor.
- To obtain credit, an individual course must be passed with at least a 75% average.
- Students may be required to withdraw from the program at any time if they fail to maintain a minimum cumulative average of 78% in their coursework or if they fail to receive satisfactory progress reports regarding their research activities.
- Courses taken with a grade below 75% cannot be retaken for graduate course credit.
- Core courses:
    - Applied Electromagnetics and Photonics
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
        - ECE 675 Radiation and Propagation of Electromagnetic Fields
    - Artificial Intelligence
        - ECE 606 Algorithm Design and Analysis
        - ECE 613 Image Processing and Visual Communication
        - ECE 657 Introduction to Machine Learning
        - ECE 657A Introduction to Artificial Intelligence
        - ECE 659 Intelligent Sensors and Sensor Networks
    - Biomedical Engineering
        - ECE 601 Foundations of Biology in Engineering
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 609 Engineering Analysis of Living Cells
        - ECE 638 Biosensing: Fundamentals and Applications
    - Communications and Information Systems
        - ECE 602 Introduction to Optimization or CO 602/CM 740/CS 795 Fundamentals of Optimization
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks
        - ECE 611 Digital Communications
        - ECE 612 Information Theory
        - ECE 613 Image Processing and Visual Communication
    - Computer Hardware
        - ECE 606 Algorithm Design
        - ECE 621 Computer Organization
        - ECE 627 Register-transfer-level Digital Systems
        - ECE 637 Digital Integrated Circuits
    - Computer Software and Systems
        - ECE 606 Algorithm Design and Analysis or CO 602/CM 740/CS 795 Fundamentals of Optimization or CS 666 Algorithm Design and Analysis

        - ECE 652 Methods and Principles of Safety-critical Embedded Software
        - ECE 653 Software Testing, Quality Assurance and Maintenance or CS 647 Software Testing, Quality Assurance, and Maintenance
        - ECE 654 Software Reliability Engineering
        - ECE 656 Database Systems
        - ECE 657 Introduction to Machine Learning or ECE 657A Introduction to Artificial Intelligence or CS 680 Introduction to Machine Learning or CS 686 Introduction to Artificial Intelligence
        - CO 685 The Mathematics of Public-Key Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography
    - Control, Robotics, and Autonomous Systems
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals or Optimization
        - ECE 604 Stochastic Processes
        - ECE 682 Multivariable Control Systems
        - ECE 686 Filtering and Control of Stochastic Linear Systems
        - ECE 687 Robot Dynamics and Control
        - ECE 688 Nonlinear Systems
    - Integrated Devices, Circuits and Systems
        - ECE 630 Physis and Models of Semiconductor Devices
        - ECE 631 Microelectronic Processing Technology
        - ECE 634 Organic Electronics
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
    - Nanoengineering
        - ECE 630 Physics and Models of Semiconductor Devices
        - ECE 633 Nanoelectronics
        - ECE 634 Organic Electronics
        - ECE 635 Fabrication in the Nanoscale: Principles, Technology and Applications
        - ECE 672 Optoelectronic Devices
    - Power and Energy Systems
        - ECE 661 Power System Protection and Relaying
        - ECE 662 Power Systems Analysis and Control
        - ECE 663 Energy Processing
        - ECE 665 High Voltage Engineering Applications
        - ECE 666 Power Systems Operation
        - ECE 668 Distribution System EngineeringCore courses:
    - Quantum Engineering
        - ECE 676/QIC 750 Quantum Information Processing Devices
        - ECE 677/QIC 885 Applied Quantum Mechanics
        - QIC 710 Quantum Information Processing

Existing

Graduate Course Requirements

- The coursework associated with the program is intended to provide a foundation for advanced learning in the chosen field of research. A minimum of 4 courses (0.50 unit weight per course) is required for a PhD student holding a MASc degree or equivalent (7 0.50 unit weight courses from a Bachelor program). At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved areas of specialization as specified in the student's letter of admission, unless this course requirement has already been achieved during a University of Waterloo Electrical and Computer Engineering MASc program. The remaining 2 courses may be taken from outside of the Department but must be from the faculties of Engineering, Math, and/or Science (unless otherwise approved). All PhD students are required to take a minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2 course minimum. The choice of courses must meet with the approval of the supervisor. The faculty supervisor will consider the level and adequacy of each student's preparation in drawing up the candidate's program. It is expected that candidates will maintain a 78% minimum cumulative average in their course work. To obtain credit, an individual course must be passed with at least 75%.
- Core courses:
    - Antennas, Microwaves, and Wave Optics
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
        - ECE 675 Radiation and Propagation of Electromagnetic Fields
    - Biomedical
        - ECE 601 Foundations of Biology in Engineering
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 609 Engineering Analysis of Living Cells
    - Circuits and Systems
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
    - Communications and Information Systems
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks
        - ECE 611 Digital Communications
        - ECE 612 Information Theory
        - ECE 613 Image Processing and Visual Communication
    - Computer Hardware
        - ECE 606 Algorithm Design
        - ECE 621 Computer Organization
        - ECE 627 Register-transfer-level Digital Systems
        - ECE 637 Digital Integrated Circuits
    - Computer Software
        - ECE 606 Algorithm Design and Analysis or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795) or CS 666 Algorithm Design and Analysis
        - ECE 652 Methods and Principles of Safety-critical Embedded Software
        - ECE 653 Software Testing, Quality Assurance and Maintenance or CS 647 Software Testing, Quality Assurance, and Maintenance
        - ECE 654 Software Reliability Engineering
        - ECE 656 Database Systems
        - ECE 657A Data and Knowledge Modelling and Analysis or CS 680 Introduction to Machine Learning or

CS 686 Introduction to Artificial Intelligence
        - CO 685 The Mathematics of Public-Key Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography
    - Nanotechnology
        - ECE 630 Physics and Models of Semiconductor Devices
        - ECE 633 Nanoelectronics
        - ECE 634 Organic Electronics
        - ECE 635 Fabrication in the Nanoscale: Principles, Technology and Applications
        - ECE 672 Optoelectronic Devices
    - PAMI - Pattern Analysis and Machine Intelligence
        - ECE 606 Algorithm Design and Analysis
        - ECE 613 Image Processing and Visual Communication
        - ECE 657 Tools of Intelligent Systems Design
        - ECE 657A Data and Knowledge Modelling and Analysis
        - ECE 659 Intelligent Sensors and Sensor Networks
    - Power and Energy Systems
        - ECE 662 Power Systems Analysis and Control
        - ECE 663 Energy Processing
        - ECE 665 High Voltage Engineering Applications
        - ECE 666 Power Systems Operation
        - ECE 668 Distribution System Engineering
        - ECE 760 Special Topics in Power Systems and High Voltage Engineering (topic 11 Power System Protection and Relaying) or ECE 765 Power System Protection and Relaying
    - Quantum Information
        - ECE 676 Quantum Information Processing Devices (cross-listed with QIC 750)
        - ECE 677 Applied Quantum Mechanics (cross-listed with QIC 885)
        - QIC 710 Quantum Information Processing
    - Silicon Devices and Integrated Circuits
        - ECE 630 Physics and Models of Semiconductor Devices
        - ECE 631 Microelectronic Processing Technology
        - ECE 634 Organic Electronics
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 672 Optoelectronic Devices
    - Systems and Controls
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 604 Stochastic Processes
        - ECE 682 Multivariable Control Systems
        - ECE 686 Filtering and Control of Stochastic Linear Systems
        - ECE 688 Nonlinear Systems
    - VLSI - Very Large Scale Integration
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
    - Wireless Communication
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks

- ECE 611 Digital Communications
- ECE 612 Information Theory
- ECE 613 Image Processing and Visual Communication

Milestone Requirements

PhD Comprehensive Examination I and PhD Comprehensive Examination II

- Students are required to meet the University-level PhD Comprehensive Examination minimum requirements, 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.
    - Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department.
    - Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements.
    - Academic integrity: Consistent with University-level minimum requirements.
- In addition to the University-level and Faculty-level PhD Comprehensive Examination minimum requirements, students in the PhD in Electrical and Computer Engineering program are also required to meet the following requirements:
    - Students must complete the Background Comprehensive Examination and the Comprehensive Proposal Examination which are conducted by the Department for each candidate.
    - The first exam, the Background Comprehensive Examination, will be held before the end of the third term (fourth term if from an incomplete MASc). The main objective of this examination is to satisfy the Department that the candidate has a broad knowledge of their field and a thorough technical background to pursue their research; the candidate will be questioned on their background preparation.
    - The second exam, the Comprehensive Proposal Examination, will be held no later than the student's sixth term and only after the Background Comprehensive Examination has been successfully completed. The main objective of this examination is to examine and approve the thesis proposal.
    - The result of these examinations is the identification of an Advisory Committee which has examined and approved the candidate's background and thesis proposal and is willing to assist the supervisor with the subsequent research program. The validity of the comprehensive examination expires after three years.
    - Students who do not complete either Comprehensive Examination by the stated deadline, or fail either exam on their second attempt, will be required to withdraw from the program.
    - The Background Comprehensive Examination Committee does not include the supervisor(s) and must consist of three members of the University, one of whom must be from ECE and two of whom can be internal or external to ECE (but within the University of Waterloo). The Proposal Comprehensive Examination Committee must consist of the supervisor(s) plus three members of the University, two of whom must be from ECE and one of whom must be external to ECE (but within the University of Waterloo). It is the supervisor's responsibility to form each of these committees.
- Detailed procedures are available in the "PhD comprehensive examination process" section of the Electrical and Computer Engineering website.

PhD Seminar

- The aim of the seminar is to allow students to gain experience in preparing and presenting their work. The seminar is to be held no later than the end of the third year (ninth term) after the initial registration in the program. The seminar must be attended by the student's supervisor and their Advisory Committee. Other Faculty members and PhD and MASc students may also be in attendance. Since this is not intended to be an examination, the seminar presentation and the feedback communication, would be regarded as satisfying the seminar credit requirements.
- Students who do not complete the PhD Seminar by the stated deadline will be required to withdraw from the program.

PhD Thesis

- The primary objective of the program is the accomplishment of independent and original research work and reporting thereon in a research thesis.
- The requirements for the PhD degree are completed when the student successfully defends their thesis before an Examination Committee. This committee should consist of the supervisor, three other members of the University (at

least one of whom should be from outside the Department) and an external examiner. Faculty from other Departments who hold cross appointments in the Department are counted as departmental members in defining examining committees.

Notes

- Department of Electrical and Computer Engineering website
- Doctor of Philosophy (PhD) in Electrical and Computer Engineering future students program page

Workflow Information

Workflow Path	Faculty/AFIW Path(s) for Workflow	Senate Workflow
Committee approvals	Faculty of Engineering	--

Dependencies

Dependent Courses and Programs/Plans

There are no dependencies

MASc in Electrical & Computer Engineering
Master of Applied Science (MASc) in Electrical and Computer Engineering

Under Review | Winter 2026

Proposal Information

Status
Active

Workflow Status
In Progress

SGC, Senate Graduate Council (SGC) expand ▲
Waiting for Approval | Approval Delegate(s)

Tim Weber-Kraljevski
Diana Goncalves
Melanie Figueiredo
Ashley Day
Tony Ly

Changes

- Effective Term and Year
- Graduate Research Fields
- Thesis Option: Course Requirements
- Admin Notes

Effective Date and Career

Career
Graduate

Important!

Proposed
Effective Term and Year
Winter 2026

Existing
Effective Term and Year
Fall 2024

Proposal Details

Proposal Type
Change

Academic Unit Approval
2025/01/23

Quality Assurance Designation
Major Modification

Major Modification Categories
Add/re-name a graduate research field, graduate specialization, honours, option, specialization, undergraduate diploma, minor
Closure of a graduate research field, graduate specialization, honours, option, specialization, undergraduate diploma, minor

Is there an impact to existing students?
No

Is the credential name changing?
No

Graduate Co-operative Requirements
Not Applicable

Change to Learning Outcomes
No

Rationale and Background for Change(s)
Update and re-organize the ECE research fields and cleanup wording in the course requirements section: The research fields in ECE have remained unchanged for a long time. This update modernizes their names to reflect recent advancements and consolidates them for greater clarity.
Additionally, this revision updates the list of core courses associated with each research field. All ECE MASc students must pass at least two courses from the list of core courses for their designated research field, as specified in their letter of admission.

Consultations (Departmental)

Supporting Documentation

General Program/Plan Information

Faculty
Faculty of Engineering

Academic Unit
Department of Electrical and Computer Engineering

Graduate Field of Study
Electrical and Computer Engineering

Faculty
Faculty of Engineering

Program/Plan Name
Master of Applied Science (MASc) in Electrical and Computer Engineering

Graduate Credential Type
Master's

Accelerated Program
Not applicable

Study Options (New)
Thesis

Program Types

Admit Term(s)
Fall
Winter
Spring

Delivery Mode
On-campus

Delivery Mode Information

Length of Program

- The minimum period of registration for the Master's degree is two terms after an Honours Bachelor's degree or equivalent. The maximum time limit is six terms for the regular program and fifteen terms for the part-time program. Extensions beyond six terms must be approved by the Faculty Graduate Studies Office.

Registration Option(s)
Full-time
Part-time

Registration Options Information

Proposed

Graduate Research Fields

- Applied Electromagnetics and Photonics
- Artificial Intelligence
- Biomedical Engineering
- Communications and Information Systems
- Computer Hardware
- Computer Software and Systems
- Control, Robotics, and Autonomous Systems
- Integrated Devices, Circuits and Systems
- Nanoengineering
- Power and Energy Systems
- Quantum Engineering

Existing

Graduate Research Fields

- Antennas, Microwaves and Wave Optics
- Biomedical
- Circuits and Systems Including Computer - Aided Design
- Communications and Information Systems
- Computer Hardware
- Computer Software
- Nanotechnology
- Pattern Analysis and Machine Intelligence (PAMI)
- Power and Energy Systems
- Quantum Information
- Silicon Devices and Integrated Circuits
- Systems and Control
- Very Large Scale Integration (VLSI)
- Wireless Communication

Graduate Specializations

Additional Program Information

Admissions

Admission Requirements: Minimum Requirements

- The Department of Electrical and Computer Engineering requires either (i) a 75% overall standing in the last two years, or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to a Master's program for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to a Master's program for applicants educated outside of Canada.
- At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission.
- English language proficiency (ELP) (if applicable)

Admission Requirements: Application materials

- Résumé
- Supplementary information form
- Transcript(s)

Admission Requirements: References

- Number of references: 2
- Type of references: at least 1 academic

Requirements Information

Graduate Degree Requirements

- Students must complete the course and milestone requirements listed below in addition to the Graduate Academic Integrity Module (Graduate AIM).

Thesis Option: Course Requirements

No Rules

Proposed

Thesis Option: Course Requirements

- Students must obtain at least 5 courses (0.50 unit weight per course) of graduate credit.
- A minimum of 3 courses must be taken from within the Faculty of Engineering. A maximum of 2 courses may be taken from outside the Faculty of Engineering but must be from the Faculties of Mathematics and/or Science.
- At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved research fields as specified at the time of the student's admission.
- A minimum of 2 courses must be taken from within the Department of Electrical & Computer Engineering. Core courses may count towards this 2 course minimum.
- The choice of courses must meet with the approval of the supervisor.
- To obtain credit, an individual course must be passed with at least a 65% average.
- Students may be required to withdraw from the program at any time if they fail to maintain a minimum cumulative average of 70% in their coursework or if they fail to receive satisfactory progress reports regarding their research activities.
- Courses taken with a grade below 65% cannot be retaken for graduate course credit.
- One advanced undergraduate course at the 400 or 500 level may be allowed for graduate credit. The advanced undergraduate course must be approved for graduate credit and confirmed in writing by the Department Associate Chair for Graduate Studies at the time of registration.
- The Department may recommend that credit be allowed for courses taken at other institutions. In special cases, 2 courses (0.50 unit weight) may be approved.
- Core courses:
    - Applied Electromagnetics and Photonics
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
        - ECE 675 Radiation and Propagation of Electromagnetic Fields
    - Artificial Intelligence
        - ECE 606 Algorithm Design and Analysis
        - ECE 613 Image Processing and Visual Communication
        - ECE 657 Introduction to Machine Learning
        - ECE 657A Introduction to Artificial Intelligence
        - ECE 659 Intelligent Sensors and Sensor Networks
    - Biomedical Engineering
        - ECE 601 Foundations of Biology in Engineering
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 609 Engineering Analysis of Living Cells
        - ECE 638 Biosensing: Fundamentals and Applications
    - Communications and Information Systems
        - ECE 602 Introduction to Optimization or CO 602/CM 740/CS 795 Fundamentals of Optimization
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks
        - ECE 611 Digital Communications
        - ECE 612 Information Theory
        - ECE 613 Image Processing and Visual Communication
    - Computer Hardware
        - ECE 606 Algorithm Design
        - ECE 621 Computer Organization
        - ECE 627 Register-transfer-level Digital Systems
        - ECE 637 Digital Integrated Circuits
    - Computer Software and Systems
        - ECE 606 Algorithm Design and Analysis or CO 602/CM 740/CS 795 Fundamentals of Optimization or

CS 666 Algorithm Design and Analysis
        - ECE 652 Methods and Principles of Safety-critical Embedded Software
        - ECE 653 Software Testing, Quality Assurance and Maintenance or CS 647 Software Testing, Quality Assurance, and Maintenance
        - ECE 654 Software Reliability Engineering
        - ECE 656 Database Systems
        - ECE 657 Introduction to Machine Learning or ECE 657A Introduction to Artificial Intelligence or CS 680 Introduction to Machine Learning or CS 686 Introduction to Artificial Intelligence
        - CO 685 The Mathematics of Public-Key Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography
    - Control, Robotics, and Autonomous Systems
        - ECE 602 Introduction to Optimization or CO 602/CM 740/CS 795 Fundamentals of Optimization
        - ECE 604 Stochastic Processes
        - ECE 682 Multivariable Control Systems
        - ECE 686 Filtering and Control of Stochastic Linear Systems
        - ECE 687 Robot Dynamics and Control
        - ECE 688 Nonlinear Systems
    - Integrated Devices, Circuits and Systems
        - ECE 630 Physis and Models of Semiconductor Devices
        - ECE 631 Microelectronic Processing Technology
        - ECE 634 Organic Electronics
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
    - Nanoengineering
        - ECE 630 Physics and Models of Semiconductor Devices
        - ECE 633 Nanoelectronics
        - ECE 634 Organic Electronics
        - ECE 635 Fabrication in the Nanoscale: Principles, Technology and Applications
        - ECE 672 Optoelectronic Devices
    - Power and Energy Systems
        - ECE 661 Power System Protection and Relaying
        - ECE 662 Power Systems Analysis and Control
        - ECE 663 Energy Processing
        - ECE 665 High Voltage Engineering Applications
        - ECE 666 Power Systems Operation
        - ECE 668 Distribution System Engineering
    - Quantum Engineering
        - ECE 676/QIC 750 Quantum Information Processing Devices
        - ECE 677/QIC 885 Applied Quantum Mechanics
        - QIC 710 Quantum Information Processing

Existing

Thesis Option: Course Requirements

- The requirements for the program consist of at least 5 courses (0.50 unit weight per course) of graduate credit. A minimum of 3 courses must be taken from within the Faculty of Engineering. A maximum of 2 courses may be taken from outside the Faculty but must be from the Faculties of Math and/or Science. At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved areas of specialization as specified in the student's letter of admission. All MASc students are required to take a minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2 course minimum. The choice of courses must meet with the approval of the supervisor.
- Core courses:
    - Antennas, Microwaves, and Wave Optics
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
        - ECE 672 Optoelectronic Devices
        - ECE 675 Radiation and Propagation of Electromagnetic Fields
    - Biomedical
        - ECE 601 Foundations of Biology in Engineering
        - ECE 607 Fundamentals of Ultrasonics
        - ECE 608 Quantitative Methods in Biomedical Engineering
        - ECE 609 Engineering Analysis of Living Cells
    - Circuits and Systems
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
    - Communications and Information Systems
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks
        - ECE 611 Digital Communications
        - ECE 612 Information Theory
        - ECE 613 Image Processing and Visual Communication
    - Computer Hardware
        - ECE 606 Algorithm Design
        - ECE 621 Computer Organization
        - ECE 627 Register-transfer-level Digital Systems
        - ECE 637 Digital Integrated Circuits
    - Computer Software
        - ECE 606 Algorithm Design and Analysis or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795) or CS 666 Algorithm Design and Analysis
        - ECE 652 Methods and Principles of Safety-critical Embedded Software
        - ECE 653 Software Testing, Quality Assurance and Maintenance or CS 647 Software Testing, Quality Assurance, and Maintenance
        - ECE 654 Software Reliability Engineering
        - ECE 656 Database Systems
        - ECE 657A Data and Knowledge Modelling and Analysis or CS 680 Introduction to Machine Learning or CS 686 Introduction to Artificial Intelligence
        - CO 685 The Mathematics of Public-Key Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography
    - Nanotechnology
        - ECE 630 Physics and Models of Semiconductor Devices

        - ECE 633 Nanoelectronics
        - ECE 634 Organic Electronics
        - ECE 635 Fabrication in the Nanoscale: Principles, Technology and Applications
        - ECE 672 Optoelectronic Devices
    - PAMI - Pattern Analysis and Machine Intelligence
        - ECE 606 Algorithm Design and Analysis
        - ECE 613 Image Processing and Visual Communication
        - ECE 657 Tools of Intelligent Systems Design
        - ECE 657A Data and Knowledge Modelling and Analysis
        - ECE 659 Intelligent Sensors and Sensor Networks
    - Power and Energy Systems
        - ECE 662 Power Systems Analysis and Control
        - ECE 663 Energy Processing
        - ECE 665 High Voltage Engineering Applications
        - ECE 666 Power Systems Operation
        - ECE 668 Distribution System Engineering
        - ECE 760 Special Topics in Power Systems and High Voltage Engineering (topic 11 Power System Protection and Relaying) or ECE 765 Power System Protection and Relaying
    - Quantum Information
        - ECE 676 Quantum Information Processing Devices (cross-listed with QIC 750)
        - ECE 677 Applied Quantum Mechanics (cross-listed with QIC 885)
        - QIC 710 Quantum Information Processing
    - Silicon Devices and Integrated Circuits
        - ECE 630 Physics and Models of Semiconductor Devices
        - ECE 631 Microelectronic Processing Technology
        - ECE 634 Organic Electronics
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 672 Optoelectronic Devices
    - Systems and Controls
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 604 Stochastic Processes
        - ECE 682 Multivariable Control Systems
        - ECE 686 Filtering and Control of Stochastic Linear Systems
        - ECE 688 Nonlinear Systems
    - VLSI - Very Large Scale Integration
        - ECE 636 Advanced Analog Integrated Circuits
        - ECE 637 Digital Integrated Circuits
        - ECE 642 Radio Frequency Integrated Circuit Design
        - ECE 671 Microwave and RF Engineering
    - Wireless Communication
        - ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross-listed with CM 740 and CS 795)
        - ECE 603 Statistical Signal Processing
        - ECE 604 Stochastic Processes
        - ECE 610 Broadband Communication Networks
        - ECE 611 Digital Communications
        - ECE 612 Information Theory
        - ECE 613 Image Processing and Visual Communication
- Students are normally expected to take graduate courses at the 600 or 700 level. 1 advanced undergraduate (400 level) Electrical or Computer Engineering course may be allowed for graduate credit. It is expected that both the

student and supervisor should provide adequate justification and complete the required paperwork before any undergraduate course is approved for credit.
- The advanced undergraduate courses must be at the 400 or 500 level as given in the Undergraduate Studies Academic Calendar and must be approved for graduate credit and confirmed in writing by the Department Associate Chair for Graduate Studies at the time of registration.
- Students may be required at any time to withdraw from the program if they fail to maintain a minimum grade of 65% in each of the 5 courses and a cumulative average of at least 70% in the coursework portion of their approved study program or if they fail to receive satisfactory progress reports regarding their research activities.
- The Department may recommend that credit be allowed for courses taken at other institutions. In special cases, 2 courses (0.50 unit weight) may be approved.

Thesis Option: Milestone Requirements

Master's Thesis

- The primary objective of the program is the completion of research work and reporting thereon in a master's thesis.
- The topic of the thesis is arranged by students and their faculty supervisor(s). The research work leading to the thesis must be performed under the direction of the faculty supervisor(s).
- Students must orally defend their thesis before a thesis examination committee for their thesis to be accepted. Candidates first present their research work orally in an organized and informative manner. The presentation is followed by questioning from the examination committee.
- The thesis examination committee consists of the supervisor(s) as well as a regular faculty member from the Department of Electrical and Computer Engineering and an additional examiner whose expertise can support the evaluation of the master's thesis.
- The role of the examining committee is to read the thesis and asses its quality in terms of the student's ability to (i) define a research problem, (ii) provide sufficient understanding of the relevant literature and (iii) critically evaluate and analyse the research outcomes.

Notes
- Department of Electrical and Computer Engineering website
- Master of Applied Science (MASc) in Electrical and Computer Engineering future students program page

Workflow Information

Workflow Path	Faculty/AFIW Path(s) for Workflow	Senate Workflow
Committee approvals	Faculty of Engineering	--

Dependencies

Dependent Courses and Programs/Plans

There are no dependencies