

FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

Biology Graduate Programs

Date of Review: March 25 – 26, 2025

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response and assessments of the graduate programs offered by the Department of Biology. This report identifies the significant strengths of the program, together with opportunities for program improvement and enhancement, and it sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the Final Assessment Report; who will be responsible for providing any resources entailed by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations and who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

Executive Summary of the Review

In accordance with the Institutional Quality Assurance Process (IQAP), the Department of Biology submitted a self-study in January 2025 to the Vice-Provost and Dean of Graduate Studies to initiate the cyclical program review of its program. The approved self-study presented program descriptions, learning outcomes, and analyses of data provided by the Office of Institutional Research and Analysis. Appendices to the self-study contained the CVs for each full-time member in the department.

Two arm's length external reviewers and one internal reviewer were endorsed by the Dean, Faculty of Science, and selected by the Vice-Provost and Dean of Graduate Studies. The review team reviewed the self-study documentation and then conducted a virtual review to McMaster University on March 25-26, 2025. The review included interviews with the Deputy Provost, Faculty Dean, Vice-Provost and Dean of Graduate Studies, Associate Dean, Grad Studies and Research, Chair of the program and meetings with groups of current students, full-time faculty and support staff.

The Chair of the program and the Dean of the Faculty of Science submitted responses to the Reviewers' Report (June 2025). Specific recommendations were discussed and clarifications and corrections were presented. Follow-up actions and timelines were included.

- **Strengths**
 - Success at recruiting high-quality students from diverse backgrounds
 - Strong sense of community and engagement among students
 - Excellent culture of mentorship and supportive training environment
 - Rigorous yet fair assessments
 - Courses and program requirements are appropriate and are meeting the needs of graduate students
 - High rate of student success after graduation

- **Opportunities for Improvement and Enhancement, including appropriateness of resources**
 - Given forthcoming retirements, faculty renewal will be needed to maintain program quality and sustainability
 - Community space for graduate students should be maintained during upcoming renovations
 - Refine learning outcomes for the new Graduate Seminar course and consider EDI-I in degree level expectations
 - Expand professional development training
 - Eliminate minor inconsistencies in information sources about graduate program expectations and exams
 - Improve the timing of graduate form approval processes by the School of Graduate Studies

Summary of the Reviewers' Recommendations with the Department's and Dean's Responses

Recommendation #1:

Ensure that faculty renewal follows recent and impending retirements as this will be critical for maintaining the graduate program

We recognize that the Faculty of Science is currently under a hiring pause and that the budget of Ontario universities is currently challenging. However, close attention must be paid to the number of retirements (8) that have already occurred within the Department of Biology and those that are forthcoming (4) and ensure that strategic faculty renewal takes place. Currently, the department's graduate student enrolment is strong and stable (slight decrease in PhD in 2024, Fig. 1) but the self-study notes that there are several factors that could contribute to decreased enrolment including less funding to NSERC Discovery grants and increasing cost of living in Hamilton. We further note that renovations to the building and temporary compression of space will also contribute to fewer students being taken on by supervisors, presenting a potential graduate student bottleneck that will be compounded temporally with a pulse of retirements and faculty attrition. Gaps due to unreplaced retirements also have the potential to leave the Department with a lack of critical mass in critical subject areas and expertise. In addition, while delivery of the undergraduate programs is mission critical, a lack of graduate students as teaching assistants will impact the quality of teaching in laboratories. Furthermore, with less faculty, there will be a corresponding decrease in the number

and diversity of graduate courses being offered. Currently, graduate students are happy with the number of available courses.

Department's Response and Actions to be Taken:

Faculty renewal is a major priority for the department. When all planned retirements over the next few years are complete, the number of research faculty in our department will fall to only 21.5 if no new faculty are hired. This represents a massive contraction, as our department has historically had well over 30 research faculty members. For comparison, there were 31 research faculty who supervised grad students in the years leading up to this program review. Given that the median age of current faculty in our department is 59, we anticipate more retirements in the near future. We agree with the Reviewers' recommendation that close attention must be paid to this issue, and that hiring **many** new research faculty is required to avoid a lack of critical mass and expertise in key subject areas. The renewal of research faculty to supervise graduate students and teach graduate (and undergraduate) courses is absolutely essential for maintaining the strength, breadth, and size of our graduate program, and for providing a skilled pool of graduate teaching assistants to support our undergraduate programs.

Fortunately, the department is well prepared for the massive task ahead for faculty renewal. We carried out a comprehensive strategic planning exercise after our 2018 IQAP review, which identified the department's key pillars of research strength, now and into the future. Guided by our strategic plans and requirements for undergraduate and graduate teaching, the department has developed a set of priorities for future hires of research faculty. These priorities have been and will continue to be reviewed and revised annually as needs and faculty complement change. We look forward to working with the Faculty of Science to help realize these priorities and to maintain – and ideally build on - the strength of our graduate program and associated research activities.

Dean's Response:

While hiring is currently paused across the Faculty of Science, we recognize program needs to replace faculty – a need that has been identified by each academic unit within the Faculty. The Faculty Appointment Advisory Committee (FAAC) recently (2024/25) asked each unit for their priority hire needs, with Biology's response based on their own internal discussions and strategic plan. While we were unable to move from proposals to hires, this provided the Dean's office with an understanding of critical needs in each academic unit. When the funding environment improves and with support from the Provost's Office, we look forward to re-opening our hire process.

Recommendation #2:

Ensure that the strong community of graduate students that currently exists continues during building renovations through the provision of communal space.

We were impressed by the sense of community that the graduate students have amongst themselves. This is often a challenge in other departments that are spread across multiple buildings. Having a strong sense of community provides students with support in challenging times and a sense of belonging can decrease stress and increase mental well-being, which in turn has a positive influence on engagement and productivity. It is likely that not only has the space with communal desks contributed to this but the graduate student lounge. We highly recommend that while this space is

being renovated that considerable effort be made to retain the graduate student lounge and/or access to communal space within the same building or a nearby adjacent building. We understand that faculty offices will be used for student desks, but the communal space is critical. We heard considerable positivity about the renovations in that sharing of labs will aid in community building along research themes. We also heard a lot of feedback on the success of the Graduate Research Day and how well this is attended and enjoyed by students.

Department's Response and Actions to be Taken:

Maintaining a strong graduate student community throughout upcoming renovations is a major priority for the department. Indeed, as stated in the current program review, "one of the strongest elements of the graduate program is the sense of community amongst the students", and we are committed to maintaining this strong sense of cohesion and cohort support. The Associate Chair (Research) has met with graduate students to discuss and solicit feedback on renovation plans, and has also conducted online polls to capture feedback from as many other students as possible. Communal office space was identified as a priority that is being included in the Life Science Building renovation plans. Whenever possible, students with overlapping research interests will be co-localized to foster community building and help build/maintain new and existing student networks. Communal social and networking space in the lounge was also identified as a priority for maintaining a strong graduate student community. Fortunately, access to the lounge will be maintained during renovations involving the north wing and central core areas. The lounge will be unavailable while the south wing undergoes renovations, so we plan to use the lobby level of the new greenhouse addition as a dedicated social space for grad students during this time.

We are also developing other ideas to help maintain a strong graduate student community throughout upcoming renovations. We will continue to support and engage with the Biology Graduate Student Society (BGSS) to support them during the renovations so they can keep up their great work. For example, we would prioritize space for the BGSS to maintain their weekly game nights within the communal social space. We are also considering a new weekly networking event, possibly associated with seminars or Friday morning coffee and donuts, to regularly bring graduate students, faculty, and staff together. Finally, we are very fortunate to have received a significant donation from an anonymous biology faculty member to support our graduate student community, with an interest in facilitating more quality social activities for this group; these funds will allow us to expand our graduate community building event options during the renovation.

Dean's Response:

We are pleased to hear of the strong sense of community among Biology's graduate students, and we want to ensure that this sense of community remains as the Life Science building is renovated. Biology's plans to maintain community during building renovation are sound, and additional community events will be welcomed. Biology may also want to consider opportunities for community and team building at other locations on campus. It is also important to note that graduate students are able to participate in events offered by the Faculty of Science (i.e., its annual Graduate Research Symposium), the Science Graduate Students Association (SciGrad) (i.e., Alumni night, AGM, Fall Fun night and cookout), and the Graduate Students Association.

Recommendation #3:

Align learning outcomes with the biology graduate seminar course requirement (BIOLOGY 700) and consider EDI-I in degree level expectations.

It appears that the required biology graduate seminar requirement has succeeded in increasing attendance to the seminar series among graduate students. However, this has resulted in a perception that the only reason that this is required is to ensure that attendance is high at these seminars, particularly with external visitors. While we heard that graduate students enjoy attending and value meeting external guests, there was some frustration expressed around the lack of attendance by faculty. We recommend that this course be reframed with less focus being placed on increasing attendance and more on learning outcomes (including sharing these outcomes with students) and explicitly connecting this course with program learning outcomes and degree level expectations (DLE 1, 4 & 5 for both MSc and PhD). We also recommend that efforts be made to encourage faculty to participate in the seminar series as role models for graduate students.

Recognizing that McMaster has identified priorities around equity, diversity, inclusion and Indigeneity (priorities 1, 4), the department may want to consider adding in degree level expectations for EDI-I. It appears that there is substantial training already occurring in the programs that would reflect inclusion of this in learning outcomes and DLE. The department may want to consider minimum training requirements or workshop hours to reflect this DLE.

Department's Response and Actions to be Taken:

We agree with the Reviewers that the communication of learning outcomes for Biology 700 should be improved. Biology 700 is a new graduate course that is required for all in-program graduate students and was offered for the first time in the 2024-2025 academic year. Improving graduate student attendance at seminars was undoubtedly one of its key goals (by requiring that grad students attend at least 12 of the 20-30+ seminars offered within the department and across campus per academic year). However, the course and associated seminars also serve vital roles in our graduate program, in fostering a deeper and broader understanding of Biology, reinforcing the research process, and honing an awareness of the limits of biological understanding. Seminars also provide essential opportunities to observe, appreciate, and hone effective communication skills. These important learning outcomes align strongly or moderately with every degree level expectation for both MSc and PhD students (DLE1-6), but to date they have not been as well-communicated as they could have been. To address this issue, we will describe these learning outcomes in the course outline for Biology 700. We are also in the process of developing a poll to solicit feedback from our graduate students on how well the course met these learning outcomes, and what we can improve in future iterations.

We believe the frustration of some graduate students that not all faculty attend seminars on a regular basis may be somewhat misplaced. Roughly half of Biology's faculty attend the seminars on a consistent basis (similar to the proportion of graduate students that attend any given seminar), and of the remaining faculty, there are always a few on sabbatical or those with teaching times that overlap with seminar times and thus are not available to attend. However, the departmental leadership does share the students' frustration that some faculty only attend seminars when they are very close to their research area. Therefore, we will make greater efforts to encourage faculty participation in multiple ways. Firstly, we are considering starting a dedicated social event after each seminar as an added perk of attending the seminar itself. We have held a few of these in the past and they have been well attended, and they would have the added advantage of helping maintain our strong graduate student community. Secondly, faculty will be encouraged to report seminar attendance and hosting in their annual records of activities, and to discuss them in annual meetings with the Chair.

Thirdly, the instructors of Biology 700 along with the seminar series coordinator will begin tracking seminar attendance and identifying which if any sub-disciplines of biology are weakly represented. Fourthly, we have and will continue to solicit requests from all faculty to invite and host dynamic seminar speakers in their respective research areas. The motivation of some faculty to do so has been lacking over the last several years, in large part because our departmental budget has only allowed for minimal reimbursement of travel expenses (e.g., GO train ticket, daily parking), so visits by anyone except those from nearby universities must be supported by funding from research grants. This constraint could be alleviated with greater investment into seminar programs by the Faculty of Science.

As noted in the program review, there are substantial EDI-I training opportunities built into our graduate programs. Multiple courses, training modules, resources, and events are available from the School of Graduate Studies, Human Resources, and the Equity and Inclusion Office (e.g., SGS 202, EDIA Fundamentals modules, EDII-themed lunchtime talks). Many Biology faculty members and students are heavily involved in EDI-I initiatives across campus (e.g., Women in Science and Engineering [WISE]). With few exceptions (e.g., SGS 201), participation in EDI-I related training and events is highly encouraged but remains voluntary at McMaster. In our department specifically, the EDI committee organizes several events related to EDI-I throughout each year, which have been well attended and have encouraged our students to think deeply about EDI-I issues. Since many of these events are tied to our departmental seminar series, it would be effective for program milestones related to EDI-I to be managed as part of the Biology 700 course. Therefore, to address the Reviewers' recommendation related to EDI-I, we will include the requirement that EDI-I related activities be part of the requirement for Biology 700 (e.g., student reflections on EDI-I seminars) and learning outcomes related to EDI-I will be explicitly stated in the course outline. This will avoid making specific training overly prescriptive and will provide students with the flexibility to focus on and explore diverse EDI-I issues and opportunities.

Dean's Response:

Biology 700 was offered for the first time in the 2024/25 academic year. Like any course, opportunities to adjust and fine-tune its structure and delivery occur after its first offering. Reframing the course with sightlines to specific learning outcomes, including EDII, will position this course better within the Department's set of offerings. Biology is encouraged to work with the Associate Dean, EDII to ensure best practices as these are implemented.

Recommendation #4:

Consider integrating professional development requirements into the graduate programs for students and include this as a program learning outcome.

During the site visit, we heard a fair amount regarding the MacPherson Institute and that faculty members supported the additional training taken by students through the programs offered at MacPherson around teaching and learning. However, given that few students may go forward in the academy it is recommended that additional professional development be explored by the department for graduate students. A professional development requirement for the graduate program could be tailored to individual students depending on their interests, and Biology might consider a model in which each student develops a professional development plan with input from their advisory

committee that includes a minimum number of hours dedicated to specific professional development activities. These activities can include career development, soft-skills training, industrial and entrepreneurial activities, outreach and community connections. While it is not expected that all faculty members will be able to provide this, other institutional or external organizations could be explored to provide these experiences which can also be quite broadly defined. This could also include recognition of specialized training courses offered at other institutions [e.g. biological identification, field work techniques and certification (drone certification, electrofishing, first aid etc.)]. Many graduate students already participate in professional development activities, but the Department might consider taking it a step further and formally requiring and recognizing professional development activity as a program learning outcome.

Department's Response and Actions to be Taken:

This is a fantastic recommendation that we are eager to better address in our graduate program. The Faculty of Science has developed many new resources for career development through the Science Graduate Career Services Office and the Science Careers and Experience Centre, including seminars, group workshops, and one-on-one career counselling and support. We recently incorporated a presentation from these offices in our orientation for new graduate students. However, their resources continue to grow and evolve, and many senior students may be less familiar with the services and activities on offer. To increase awareness of these resources, we will start featuring upcoming events from these offices in our monthly departmental newsletter. We will also work to ensure faculty are also aware of these resources by inviting representatives from the Science Graduate Career Services and the Science Careers and Experience Centre to present in one of our monthly departmental council meetings. We also intend to continue relevant career development activities we are already doing in the department. For example, we often invite alumni that went on to alternative career paths outside academia to speak at our Graduate Research Day, where they provide advice on the skills and application strategies that can lead to success in diverse careers.

To further address this recommendation, we will work with the Faculty of Science, the School of Graduate Studies, and the University regarding further opportunities for professional development plans for graduate students. For example, we could consider the possibility of having all new students draft and present a professional development plan to their supervisory committee as part of their first committee meeting report. This plan could include career mentoring and soft-skills training, specialized training courses at McMaster or other institutions, industrial and entrepreneurial activities, and/or outreach and community connections. Students could then receive feedback on their plan in their first supervisory committee meeting, and then discuss progress and refinement of their initial goals in subsequent committee meetings. The improvement of professional development training for graduate students is an important goal of the Faculty of Science, the School of Graduate Studies, and the University, and we look forward to working collectively towards these improvements.

In addition to existing resources, the Faculty of Science recently introduced a Science Leadership Academy (inaugural cohort in 2025-2026). Biology graduate students can apply to the program and receive meaningful training and networking opportunities to grow as science leaders, during which they create leadership development plans, take part in 5 leadership coaching sessions, and receive a certificate of completion. The Science Careers and Experience Centre is also currently developing a program that provides graduate students with opportunities to be immersed in "work integrated learning" (WIL). The details for how Biology graduate students could incorporate WIL into their degree progression has yet to be finalized, but this could represent a fantastic opportunity for

students to receive career-relevant training as part of their degrees, although we recognize that this may not be feasible for students in all research areas. We will continue to monitor these developments and advertise them to our students as the programs develop.

Dean's Response:

The Faculty of Science recognizes that only a small number of our graduate students move into academics, with the majority finding employment in the public or private sectors beyond the university. With this knowledge, the Faculty is actively stepping into the career planning and support space through our Science Graduate Career Services Office and the Science Careers and Experience Centre. A growing number of supports are offered or are being explored, and we recently re-committed to graduate career opportunities by hiring a Graduate Careers Officer with the mandate of growing and developing new services. Moving forward, we are hoping to include Work Integrated Learning (WIL) opportunities for our graduate students. Graduate Studies also offers career development services, and we (School of Graduate Studies [SGS] and the Faculty of Science) are working to increase the visibility and uptake of these services. Given the range of services that are already offered through the Faculty or Graduate Studies, we are hesitant to encourage individual academic units to develop their own set of services – a model that would not be financially viable and would ultimately duplicate services offered elsewhere. The Dean's office will, however, continue to raise awareness of existing opportunities and look to grow career service opportunities for its graduate students.

Recommendation #5:

Evaluate and modify the processes and timing by which the School of Graduate Studies processes service requests.

We heard from both staff and students that there are delays in the processing of critical paperwork (service requests) by the School of Graduate Studies, whereby submitted paperwork is not processed for months until close to program/graduation deadlines. The concern around this is that errors naturally arise and then the paperwork is returned to the department for correction months after submission and this creates a crunch around critical deadlines impacting staff workloads and stress among students. Paperwork should be ideally processed or reviewed for correctness upon submission rather than months later.

Department's Response and Actions to be Taken:

We agree with the Reviewers that the sometimes-lengthy delays in processing service requests and other critical paperwork are problematic and needs to be improved. We would be grateful for advocacy from the Dean of Science to communicate these issues to the School of Graduate Studies, to ensure they are aware that the adverse impacts stemming from these delays are sufficiently detrimental that they were raised in this IQAP review.

Dean's Response: The Vice-Provost and Dean of Graduate Studies has heard concerns around processing times directly from members of Graduate Council, and SGS recognizes that there can be delays in processing service requests. It is important to note that particular times of the academic year see an increased volume of requests that can delay responses. Responding to these concerns, SGS is currently working through an overhaul of its records processing, with the goal of streamlining

services to help avoid unnecessary delays and stress. The Dean's office will continue to monitor processing times and advocate for improvements if continued delays are noted.

Recommendation #6:

Ensure that instructions and expectations for graduate examinations are clearly described and consistent

We heard from staff and students that there could be mismatched expectations and/or inconsistent instructions, and information provided to graduate students and supervisors related to committee meetings, the transfer exam and the comprehensive exam. We recommend that the sources of information (handbook, website, forms etc...) be reviewed for clarity and consistency. Some of these inconsistencies, or perceptions of inconsistency, could result from variation between advisory committees and disciplines in their expectations. However, the instructions and expectations should be clearly and consistently articulated between sources

Department's Response and Actions to be Taken:

We believe this issue may have stemmed from our attempts to improve clarity and communication in response to our 2018 IQAP review. In response to that review, the department created multiple sources of guidance (e.g., guidance document in PDF form, online Graduate Guide) in an attempt to ensure all students received the necessary information. However, these sources were written by different people, at different times, and in different formats. Having multiple sources of information can lead to inconsistencies when one source is updated and another is not, and can also make managing all information more time consuming. Therefore, to address this concern, we plan to consolidate all relevant information related to our graduate program into our online Graduate Guide, thereby providing students and faculty with ready access to the information. This site can be easily revised as necessary by the Academic Program Assistant (Graduate). We will aim to review the Graduate Guide for accuracy on an annual basis, in advance of our September intake. If necessary, we will revise the descriptions of the processes and goals for supervisory committee meetings, transfer exams, and comprehensive exams to ensure greater clarity. We acknowledge that different biology subdisciplines may have different specific expectations for these processes and goals (and individual faculty have different ideas from their past experience), but we will work to ensure that general expectations are clearly articulated.

Dean's Response:

The Faculty of Science recognizes the need for consistent and accurate information with respect to program requirements and advancement so as to avoid confusion and additional stress. The Office of the Associate Dean (Graduate) will provide support and advice as the Department revises its documents to ensure that they are consistent with the Graduate Studies calendar.

Implementation Plan

Recommendation	Action(s) to be Taken	Responsibility for Leading Action (specify the role(s) that will be responsible for each action item e.g. Program Chair.)	Timeline for Completing Action (indicate specific timelines (e.g. not 'ongoing') for action)
#1. Ensure that faculty renewal follows recent and impending retirements as this will be critical for maintaining the graduate program	Continue to review and revise priorities for future hires of research faculty	Chair, in consultation with Biology faculty members	To be determined by the Faculty of Science, when the hiring pause is lifted and the competitive process for allocating new hires to departments can resume
#2. Ensure that the strong community of graduate students that currently exists continues during building renovations through the provision of communal space	Identify communal office space and allocate to graduate students during renovations	Chair, in consultation with Associate Chair (Research)	Summer 2026 (based on the anticipated start date of renovations), and continuing through the three renovation phases
	Identify and arrange for communal social and networking space while the south wing undergoes renovations	Chair, in consultation with Associate Chair (Research)	Fall 2027 (based on the anticipated start date of south wing renovations)
	Engage with the Biology Graduate Student Society (BGSS) to understand their challenges and concerns and ensure they are supported during the renovations	Chair and Associate Chair (Graduate)	Starting summer 2026 and extending throughout renovations
	Establish and support a new weekly networking event during renovation	Associate Chair (Graduate), departmental EDI committee, seminar coordinator	Starting Fall 2026

#3. Align learning outcomes with the biology graduate seminar course requirement (BIOLOGY 700) and consider EDI-I in degree level expectations	Describe learning objectives in the course outline for Biology 700	Associate Chair (Graduate) and Academic Program Assistant (Graduate)	2025-2026 academic year
	Poll graduate students to establish whether/ how well Biology 700 meets the described learning objectives	Associate Chair (Graduate) and Academic Program Assistant (Graduate)	Summer 2025
	Establish and support a new weekly networking event	Associate Chair (Graduate), departmental EDI committee, seminar coordinator	Starting Fall 2026
	Encourage faculty to report seminar attendance and hosting in their annual records of activities, for discussion with the Chair	Chair	2026
	Begin tracking seminar speakers and attendance and identifying which if any sub-disciplines of biology are weakly represented	Seminar series coordinator and the instructors of Biology 700	Starting in 2025-2026 academic year
#4. Consider integrating professional development requirements into the graduate programs for students and include this as a program learning outcome	Feature upcoming events from Science Graduate Career Services and the Science Careers and Experience Centre in our monthly departmental newsletter	Newsletter coordinator, in consultation with Chair and Associate Chair (Graduate)	Starting Fall 2025
	Invite a representative from the Science Graduate Career Services to present in one of our monthly departmental council meetings	Associate Chair (Graduate)	Fall 2025
	Invite a representative from the Science Careers and Experience Centre to present in one of our	Associate Chair (Graduate)	Winter or Fall 2026

	monthly departmental council meetings		
#5. Evaluate and modify the processes and timing by which the School of Graduate Studies processes service requests	Communicate these issues to the Dean of Science	Chair and Associate Chair (Graduate)	Summer 2025
#6. Ensure that instructions and expectations for graduate examinations are clearly described and consistent	Consolidate all relevant information related to our graduate program to our online Graduate Guide, and review annually for accuracy	Associate Chair (Graduate) and Academic Program Assistant (Graduate)	Summer 2025 and continuing

Quality Assurance Committee Recommendation

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation at the October 22, 2025, meeting. The committee recommends that the **Biology graduate** programs should follow the regular course of action with an 18-month progress report and subsequent full external cyclical review to be conducted no later than eight years after the start of the last review.