

**CARLETON UNIVERSITY COMMITTEE ON
QUALITY ASSURANCE
Cyclical Review of the graduate programs
in Chemistry
Executive Summary and
Unit Response to External Reviewers' Report & Implementation Plan**

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's graduate programs in Chemistry are provided pursuant to the provincial Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP).

EXECUTIVE SUMMARY

The graduate programs in Chemistry reside in the Department of Chemistry, a unit administered by the Ottawa-Carleton Chemistry Institute (OCCI).

As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.13-7.2.14).

The External Reviewers' report offered a very positive assessment of the programs. Within the context of this positive assessment, the report nonetheless made a number of recommendations for the continuing enhancement of the programs. These recommendations were productively addressed by the Director of the Department of Chemistry, the Dean of the Faculty of Science and the Dean of the Faculty of Graduate and Postdoctoral Affairs in a response to the External Reviewers' report and Implementation on Plan that was submitted to SQAPC on September 8th, 2022.

UNIT RESPONSE TO EXTERNAL REVIEWERS' REPORT & IMPLEMENTATION PLAN

Note: This document is forwarded to Senate, the Quality Council and posted on the Vice- Provost's external website.

Introduction & General Comments

Please include any general comments regarding the External Reviewers' Report.

The Chemistry Department was pleased to receive the Reviewers' very positive External Reviewers' report. This report was shared with our faculty and staff, and we are committed to the continual improvement of our programs to enhance the student, staff, and faculty experience. Significant feedback was received from several faculty members. A. Ianoul and R.C. Burk prepared this response. This document contains both a response to the External Reviewers' Report and an Implementation Plan (Section B) which have been created in consultation with the Dean(s).

For each recommendation ***one*** of the following responses must be selected:

Agreed to unconditionally: used when the unit agrees to and is able to take action on the recommendation without further consultation with any other parties internal or external to the unit.

Agreed to if additional resources permit: used when the unit agrees with the recommendation, however action can only be taken if additional resources are made available. Units must describe the resources needed to implement the recommendation and provide an explanation demonstrating how they plan to obtain those resources. In these cases, discussions with the Deans will normally be required and therefore identified as an action item.

Agreed to in principle: used when the unit agrees with the recommendation, however action is dependent on something other than resources. Units must describe these dependencies and determine what actions, if any, will be taken.

Not agreed to: used when the unit does not agree with the recommendation and therefore will not be taking further action. A rationale must be provided to indicate why the unit does not agree (no action should be associated with this response).

Calendar Changes

If any of the action items you intend to implement will result in calendar changes, please describe what those changes will be. To submit a formal calendar change, please do so using the Courseleaf system.

UNIT RESPONSE AND IMPLEMENTATION PLAN

Programs Being Reviewed: Chemistry Joint Graduate Programs

Prepared by (name/position/unit):

External Reviewer Recommendation & Categorization	Unit Response (choose only one for each recommendation): 1- Agreed to unconditionally 2- Agreed to if additional resources permit (describe resources) 3- Agreed to in principle 4- Not agreed to Rationales are required for categories 2, 3 & 4	Action Item	Owner	Timeline	Will the action described require calendar changes? (Y or N)
<p>1. (Opportunity) Update the communication of your program offerings, student expectations and assessments.</p> <p>Currently, the graduate handbook, departmental website, and TAC assessment forms provide students with relevant information. New graduate orientation sessions are also provided. However, in all cases, the department could make additional efforts to expand their presentations. For example, TAC assessments do not provide space for formal feedback to students (such as a graded scale in different categories for ‘above/ below/ meets expectations – more on the TAC assessment is revisited below). New graduates could be greeted through a ‘grad welcome week’ with a combination of formal and informal/ social meetings. Formal presentations of class offerings, and their benefits in different areas of research could showcase the variety of classes. Peer-to-peer grad mentoring initiatives would also be a consideration.</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> 1. Update graduate handbook 2. Develop TAC forms 3. Grad welcome week- will look into 	<p>Graduate Committee</p>	<p><i>In progress</i></p>	<p><i>N</i></p>

<p>2. (Concern) Increase faculty and student seminar opportunities</p> <p>Participation in regular seminars is a vital aspect of exposing students to different areas of chemistry. It is also critical to the promotion of the department's strengths and to raising awareness of other opportunities that exist beyond Carleton's walls. At minimum, allowing students to participate in a weekly seminar from external faculty would be expected. Seminars that focus on topics beyond straight academic research are also encouraged, be they alumni/ industry visits, training workshops, or otherwise. All faculty should have a direct involvement in student seminars. Committee members can grade student seminars, but there should be an expectation that the broader faculty attend these sessions. The distinct seminar programs from various programs (food, biochemistry, environmental toxicology) should be centralized into a cohesive seminar program, with the expectation that all students attend.</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> 1. <i>Update CHEM 5801/ 5804 seminar course</i> 2. <i>Introduced calendar changes to address differences in credits for seminars in different specializations</i> 3. <i>Centralize planning of seminars in various programs</i> 	<p><i>Graduate, Research, Planning/Priorities Committee;</i></p>	<p><i>In progress</i></p>	<p><i>Y</i></p>
<p>3. (Weakness) Increase external promotion & recruitment efforts</p> <p>The promotion of Carleton's Chemistry Department should be a continuous and constant priority of all Faculty members. With an expectation of a growing department needing to recruit new students, Carleton cannot rely solely on internal students to fill these new positions. Faculty (and senior graduate students) should reach out to schools across Canada, essentially inviting themselves to give seminars, as part of</p>	<p><i>Agreed to if additional resources permit</i></p> <p><i>Expenses related to room rental, travel, printing could be involved</i></p>	<ol style="list-style-type: none"> 1. <i>Organize university recruitment (virtual) tour for potential graduate students</i> 2. <i>Identify if the EDI focus should be representative of Carleton University, the city or the province or the national level.</i> 3. <i>Identify the EDI groups</i> 4. <i>Develop recruitment strategies to target the identified groups</i> 	<p><i>Research, Graduate, EDI committees</i></p>	<p><i>In progress, 1-2 years</i></p>	<p><i>N</i></p>

<p>formal “recruitment tours”. The annual Carleton-Ottawa poster fair could evolve into one involving a larger cohort of universities. This could present new opportunities to bring students (grad and undergrad) to your department and showcase your strengths. Conference participation can include Department-approved messaging on recruitment and research opportunities. Most important, the Department should target the recruitment of EDI groups wherever possible. A Departmental EDI committee could look further into these opportunities.</p>					
<p>4. (Opportunity) Community/ alumni engagements</p> <p>Students will always be interested in future career opportunities. Providing mechanisms to showcase the talents of existing students to local government/ industry would be appropriate. Engaging with alumni presents a powerful opportunity for promoting these skills. If not already done, maintaining a database of former graduates, would serve as a resource for the future. An annual alumnus ‘career night’ even would be beneficial to graduate and undergraduate students. Alumni can also assist in the training of soft skills (safety training, communication, SOPs, note taking, QA/QC). Making alumni part of the department’s formal seminar program would also be an excellent way to allow an exchange of ideas. Business training and commercialization could also involve</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> <i>1. Update website to showcase potential future career options, demonstrate success stories</i> <i>2. Create/update a data base of graduates</i> <i>3. Make alumnus career night event annual</i> 	<p><i>Graduate, Priorities/planning, Research committees</i></p>	<p><i>In progress</i></p>	<p><i>N</i></p>

<p>alumni. Collaboration with local industry could involve MITACS or other federally sponsored funding opportunities. Students should not only be encouraged to participate but the department should be actively involved in assisting students with these types of short-term placements.</p>					
<p>5. (Weakness). Joint Institute with University of Ottawa</p> <p>The existence of the Joint Institute of graduate studies in chemistry between Carleton and University of Ottawa, which has historical importance, has less significance in the current state of both universities' graduate programs. While there are several positives, we question the net benefit of the Joint Institute. As a prominent example, the administrative duties are adding cumbersome tasks which slow the evolution of the respective programs. The primary perceived advantage of the Joint Institute, which was pointed out to us, was the increased diversity of graduate course offerings for students across both universities. However, this could easily remain without all other aspects of the Joint Institute existing in its current form. Many graduate students at universities across Canada are already given the opportunity to follow courses from other departments and universities with relative ease, and therefore we suggest that this becomes the main link between the two programs at Carleton and Ottawa. The need to have one member of the PhD thesis advisory committee for each student from U Ottawa can also be seen as</p>	<p><i>Not agreed to:</i></p> <p><i>While joint OCCI indeed results in administrative challenges, benefits of the institute outweigh the drawbacks. This includes access to courses, especially lab-based courses, on both campuses; TAC membership, seminar attendance, Comprehensive examination committee memberships, support to newly hired faculty members.</i></p>	<p><i>1. Work on improving communication to minimize administrative load.</i></p>	<p><i>Graduate, Research, Priorities/Planning committees</i></p>	<p><i>In progress, 1-2 years</i></p>	<p><i>N</i></p>

<p>limiting. Allowing Ottawa Faculty to optionally serve as members of a grad committee would be a favorable evolution of this requirement. However, we believe there is sufficient expertise within the Chemistry Department at Carleton to form the thesis advisory committee.</p>					
<p>6. (Concern). Optional courses offered</p> <p>The list of course offerings for graduate students at Carleton appears extremely broad. However, from this list, we learned that large portion of these classes have not been taught for several years. We strongly recommend that course offerings should be streamlined, removing any from list that have not being offered in the past 5 years, or otherwise have no intent to be offered in the next 2 years. Any remaining classes in the list should be offered on a rotation basis, ideally at a minimum of every two years, such that all students would have access to each available class over their graduate career. Laboratory based courses are highly appreciated by grad students to familiarize themselves with some cutting-edge techniques not within their specific expertise. An example of this is a team-teaching model with 4-5 professors each teaching a small section on a specialized technique, with some demonstration/lab component. This also has an added effect of increasing the visibility of each research group within the grad student community.</p> <p>Another possibility would be to create a new class consisting of a modular lab where grads spend a short period working within different</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> 1. <i>Work on "cleaning up" the list of offered courses</i> 2. <i>Offer new, modular graduate courses</i> 	<p><i>Graduate committee, Priorities and Planning, New faculty members</i></p>	<p><i>In progress</i></p>	<p><i>Y</i></p>

<p>research labs. Such a course could involve direct training <u>by</u> the respective graduate students of that lab. Students could select a minimum number of modules, be provided key publications from that area, and participate in a seminar. With senior grad students teaching other grad students, one could perceive this class as replacing a current seminar course.</p>					
<p>7. (Opportunity) Seminar courses for grad students</p> <p>Streamlining of requirements between specializations (food science, environmental/toxicology, biochemistry and general chemistry stream) would increase flexibility and reduce confusion. The different seminar requirements should be equal (number of credits) across all areas of specialization in Chemistry. We find it unusual that an MSc or PhD degree in “Chemistry” with specialization in a given area (eg. food science) would require a different number of seminars and course credits than in any other specialization. Standardizing these requirements would simplify the administration and communication of course requirements and give students greater flexibility. Within the curriculum, we recognize the potential benefits of students with research focus in one area being allowed, and even encourages, to take courses in other areas. This added flexibility would also alleviate the perception of students suggesting that there is a shortage of available classes in their discipline.</p>	<p><i>Agreed to unconditionally</i></p>	<p><i>1. Make changes to grad calendar</i></p>	<p><i>Graduate, Priorities and Planning Committees</i></p>	<p><i>In progress</i></p>	<p><i>Y</i></p>

<p>8. (Opportunity) TAC meeting exams</p> <p>The implementation of regular TAC meetings on a yearly basis for all graduate students (MSc and PhD) has the benefit of providing critical feedback to each student during their studies. It also allows a correction of any areas of concern in a timely manner. We suggest that the evaluation from the committee during these TAC meetings be standardized, giving a written report with clear milestones and feedback to each student. These reports would also serve the committees for follow-up TAC meetings. Formal consequences could therefore be put in place if a rating of unsatisfactory in each category, such as productivity, scholarly, or attendance is given.</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> 1. <i>Develop TAC forms</i> 2. <i>Continue monitoring the performance of recently introduced TAC at PhD level, before introducing TAC at M Sc level.</i> 	<p><i>Graduate Committee</i></p>	<p><i>In progress, 1-2 years</i></p>	<p><i>Y</i></p>
<p>9. (Concern) Appropriate graduate student space</p> <p>It was evident that the department and its building has a severe lack of graduate student space allocated outside the research labs. Especially in a Chemistry Department, where safety is always a top priority, office space free of the lab is imperative for students to work on writing articles, planning experiments, having space for a break from the lab and discussions between students. We understand that this space may be considered a luxury, but we strongly disagree. For all students, who spend a significant portion of their days, evenings, and weekends within the department, having appropriate space to properly optimize their workload is critical. Moreover, the mental health of students cannot be ignored;</p>	<p><i>Agreed to if additional resources permit. Decisions on additional space are made at the faculty/university levels.</i></p>	<p><i>Departmental space and infrastructure committee will gather information on the available space and will consult with the Departmental graduate and the Priorities and Planning committees on the current and future needs. This information will be brought to the Dean's office.</i></p>	<p><i>Graduate, Priorities and Planning, space and infrastructure committees</i></p>		

<p>imagine being unable to take a coffee break, or chat with colleagues because there is no safe space to do so. We recognize the challenges of implementing such a recommendation. Therefore, as a minimum starting point, establishing communal and flexible office space for all students to access should be easier to implement. Certainly, any future renovations or expansions of the department space should list graduate office space as their priority.</p>					
<p>10. (Opportunity) Grad Handbook revision</p> <p>A thorough revision of the grad handbook, clearly stating all requirements, learning outcomes and opportunities for students, would be beneficial to current and future. This is a vehicle for communication of policy and expectations, and an opportunity for students who need assistance. Having all pertinent information in one document would lessen the confusion among students of what is expected of them for the successful completion of their degrees, as well as all supporting information. Here are a few specific suggestions:</p> <p>A minimum number of TA hours should be defined as an essential requirement, especially considered that mentoring and teaching is an important skill to master for graduate students.</p> <p>The handbook does not define the committee structure for an MSc. Also, there is no information about the timeline for thesis submission ahead of a defense.</p> <p>The comprehensive 1 exam is essentially described as a grad seminar, rather than an exam</p>	<p><i>Agreed to unconditionally</i></p>	<ol style="list-style-type: none"> 1. <i>Will introduce changes suggested by the external reviewer to the graduate handbook</i> 2. <i>Will consider eliminating comp 1</i> 	<p><i>Graduate committee</i></p>	<p><i>In progress</i></p>	<p><i>N</i></p>

<p>with specific knowledge to be tested. We question the value of the seminar-based exam beyond what is already taught through other required seminar courses. Potentially with the implementation of TAC meetings, the comp1 exam could be eliminated.</p> <p>The description of the PhD defense is a 10 min presentation, followed by a question period. This is an extremely short time to summarize all the work that goes into a PhD. A reference to these rules and what is expected for the thesis and defense is likely in a separate document from the Faculty of Grad studies, however, pointing towards such documentation in the grad handbook is suggested.</p> <p>In terms of financial assistance, grad students are offered TAs, research stipends from their supervisor (if no external scholarships) as well as a portion from grad studies. These numbers and minimums are not clearly laid out in the handbook. Better transparency would be beneficial.</p> <p>The timeline of the PhD program is tabulated and suggests up to 6 years of study. The PhD program should be promoted as a four-year program, with considerations of extensions under certain conditions.</p>					
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<p>11. (Weakness) Support Staff Limitations</p> <p>The department seems to be nearing a breaking point in terms of administrative and technical staff. This is a serious problem that should be considered of utmost importance for the health of the graduate program. The administration of the graduate program is under the responsibility of Chantelle Gravelle (graduate administrator), who is an invaluable asset to the Department and the program. Even though she has managed valiantly to this point, her workload will more than likely increase in the future as new research-focused faculty establish their groups. The expansion of new students from outside Carleton, including many international students, will bring added concerns and force an unsustainable situation. Adding staff to support the administrator is paramount. The head teaching lab technician (Elena Munteanu) is currently in charge of coordinating the TAs of all students, which represents a heavy workload. Could one or more senior grad students be hired in the critical summer months to assist with these assignments and associated training in a timely manner? Delayed assignment notification was expressed as a source of stress by the graduate students. Delegating some of the administrative work to senior TAs would also give them the opportunity to learn important skills such as scheduling and training.</p>	<p><i>Agreed to if additional resources permit</i></p> <p><i>Resources to hire a new staff member would be required to minimize the administrative workload.</i></p>	<ol style="list-style-type: none"> <i>1. Changes to program description will be made, and posted on the web site, and graduate student handbook,</i> <i>2. Supervisor handbook will be created</i> <i>3. Information will be gathered regarding the needs of the department, i.e. the level of the position and the responsibilities (part time, full time, seasonal, administrative, technical, financial)</i> <i>4. Based on the needs, consultation will be conducted with the Dean's office to request additional funds in the department budget.</i> 	<p><i>Graduate, Research, Priorities and Planning, committees, Chair, Dean</i></p>	<p><i>In progress</i></p>	<p><i>N</i></p>
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<p>12. (Concern). Admission Requirements</p> <p>One of the reasons why there are limited external and international students within the graduate program is likely the lack of clear admission requirements and promotion (through the departmental and grad program website) of the program to international students. If these requirements are clearly stated, the task of rating applicants would be more efficient. The grad administrator mentioned specifically that this is one of the tasks that currently occupies an exceptional amount of time. If the procedure of acceptance these students was streamlined, more external students would be admitted and thus increased the diversity of the student body within the program. Clear guidelines and promotion within the website will also provide added visibility of the program worldwide.</p> <p>As for the international bursaries for PhD level students, this is a great advantage for recruiting international PhD students, however, not offering the same opportunity at the MSc level would result in admitted PhD students directly instead of, more conservatively initially admitting them to the MSc program with the potential to fast-track into the PhD program after one-year. This causes many issues administratively if an international PhD student end up needing to finish with a MSc degree instead of the intended PhD. If the international fee waiver bursary could be implemented for all graduate students, this would alleviate these issues, and ensure the promotion into the PhD program is for clearly deserving</p>	<p><i>Agreed to in principle</i></p> <p><i>The issue has been recognized and will be looked at.</i></p>	<p><i>1. We will look at the admission standards in other comparable universities. We will update the website to clarify the admission requirements and the process.</i></p>	<p><i>Graduate Committee</i></p>	<p><i>In progress</i></p>	<p><i>N</i></p>
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students. Judging the potential of an international PhD applicant solely on paper is not an easy task.					
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