

FINAL ASSESSMENT REPORT
Evaluation of Graduate Programs
Chemistry

Faculty of Science

Cyclical Review Period: 2015–2016

Date: June 7, 2023

I. Evaluated Programs

- MSc in Chemical
- MSc in Chemical and Environmental Toxicology (collaborative)
- MSc in Chemistry; Specialization in Science, Society and Policy
- PhD in Chemistry
- PhD in Chemical and Environmental Toxicology (collaborative)

II. Evaluation Process (outline of the visit)

- The final evaluation report of the above-mentioned programs is based on the following documents: (a) the self-evaluation brief produced by the academic unit, (b) the report of the two evaluators following their virtual visit, and (c) the joint comments of the Dean of the Faculty of Science, Louis Barriault, the Program Director (Interim), Jeffrey W. Keillor.
- The on-site visit took place on April 19 and 20, 2022, and was conducted by John Corrigan, University of Western Ontario, and Michael O. Wolf, University of British Columbia. The evaluators received a full self-evaluation report, which was first presented and discussed at the Department Assembly.
- The external reviewers met with various individuals and groups including: Associate Vice-Provost, Sylvie Lamoureux, Dean, Faculty of Science, Louis Barriault, Vice-Dean, Graduate Studies, André Beauchemin, Vice-Dean, Research, Marc Ekker, Cyclical Review Lead Authors, Deryn Fogg, Graduate Director, Chemistry, Jeffrey Keillor, Paul Mayer, Department Chair, John Pezacki, Associate Chair, Darrin Richeson, EDI Team: Adam Shuhendler, Associate Professor, Departmental EDI representative and Jaclyn Brusso, Associate Professor, Vice-Dean EDI, Faculty of Science, Key Administrative Staff: Graduate Office and Department Office, Valentina Ly, Research Librarian, STEM & Health Sciences, Ingrid Moasil, Collections Librarian, faculty members, students, and alumni. The internal delegate was Frédérique Tesson.

Comments of the Internal Delegate

Overall, both evaluators and members of the Chemistry Department had the opportunity to discuss strengths and areas for improvement in the chemistry graduate programs in an open and friendly manner. The meetings followed each other at a good pace, with plenty of time for discussion.

Numerous discussions focused on student satisfaction with program progression, structure, milestones, and course scheduling. A visit to the laboratories and technology platforms gave a better appreciation of the educational value of student access to these facilities, as well as the workspaces. Student financial support was also discussed. The promotion of programs internally to undergraduates, and externally was discussed, as

well as the fact that three of the programs offered to students have not attracted any students in the last 5 years: MSc in Chemistry; Specialization in Science, Society and Policy, MSc in Chemical and Environmental Toxicology, and PhD in Chemical and Environmental Toxicology. It was noted that no graduate courses were offered in French, which some students regretted, whereas undergraduate programs are offered in both languages.

The pandemic has certainly affected students' sense of belonging to the programs, as well as their interactions with the administrative team. Improving communication within the department would help to avoid misinformation.

Overall, the evaluators found that the programs were judged very positively by current and former students.

III. Summary of Reports on the Quality of Programs

This section aims to inform the unit on the strengths and weaknesses observed during the evaluation process to improve its programs.

EMPHASIZING THE STRENGTHS AND IDENTIFYING CHALLENGES

STRENGTHS

- Strong research output, as demonstrated by the number of papers in top-ranked journals, the number of Canada and University Research Chairs, the high proportion of students receiving external support, and #5 QS ranking in Canada in 2021.
- Global reputation and visibility in catalysis science.
- One of the largest graduate programs in Chemistry in Canada.
- The MSc and PhD degrees of the University of Ottawa are offered in all major subdisciplines of chemistry.
- A wide range of state-of -the-art instrumentation and infrastructure.
- Reasonable completion times for students in both programs, MSc and PhD.

CHALLENGES

- The process for determining which courses will be offered is not well organized and causes frustration among the students.
- Although a distinctive aspect, the 6 week-long graduate courses are also a challenge since they cannot easily be co-taught with senior undergraduate courses, and they are offered in addition to regular faculty teaching.
- The demonstration and promotion of academic and professional integrity, in particular the development of strategies related to EDI and conflicts of interest are identified as objectives which could receive more attention.
- Lack of registration in the last 5 years for the MSc in Chemistry; Specialization in Science, Society and Policy, the MSc in Chemical and Environmental Toxicology, and the PhD in Chemical and Environmental Toxicology.
- Even though a distinctive feature of the program is that courses can be taught in French, and students can write their theses in French, in practice, no courses are offered in French and theses are written almost exclusively in English.
- Enhanced recruitment of French-speaking graduate students is being considered, but there has only been limited success in these efforts thus far.

IV. Program Improvements¹

The programs under evaluation are in conformity with the standards of the discipline. The following recommendations aim at maintaining or increasing the level of quality already achieved by the programs.

Recommendation #1: Setting and announcing the schedule for graduate courses for the academic year well before September is recommended. Furthermore, the Department may also wish to examine creating specific codes for Advanced Topics courses, to enhance program visibility to external students considering graduate studies at uOttawa.

Recommendation #2: Continue the efforts to develop a new program or concentration in "Biomolecular Science" aligned with the areas of research strengths in the Department.

Recommendation #3: Review the make-up of the Thesis Advisory Committee so that the supervisor does not have sole responsibility for selecting members.

Recommendation #4: Ensure that mechanisms are in place and applied to facilitate the submission and evaluation of yearly student reports, tracking of progression requirements, course completion, student publications, funding accomplishments, etc.

Recommendation #5: Develop new strategies to recruit more francophone students.

V. Action Plan

A detailed action plan has been developed by the leader of the graduate programs. This action plan, which is already being implemented, indicates the Department's agreement with the five external evaluators' recommendations. The action plan clarifies that the practice in place to select members for the thesis advisory committee (recommendation 3) is collaborative and not based on the unique input of the supervisor. Accordingly, the actions are meant to clarify the process. Likewise, the action plan confirms that mechanisms are already in place to track student progress (recommendation 4). Actions are proposed to enhance these mechanisms further.

VI. Conclusion

The graduate programs in Chemistry have many strengths, including an excellent faculty complement, a diverse body of high-quality graduate students, and the necessary infrastructure to carry out world-class research. The program is continually evolving with recent enhancements including the incorporation of EDI training, expanded soft skills development and increased focus on career opportunities outside of a traditional academic route. The improvements recommended will build on this strong foundation to enhance an already excellent program.

Schedule and Timelines

The next cyclical review will take place in no more than eight years, in 2023–2024. The self-study brief must be submitted no later than September 15, 2023.

¹ Based on the External Evaluation Report.

Unit Response and Action Plan

Faculty:

- Faculty of Science

Programs evaluated:

- Master of Science Chemistry
- Master of Science Chemistry and Specialization Chemical and Environmental Toxicology
- Master of Science Chemistry and Specialization Science, Society and Policy
- Doctorate in Philosophy Chemistry
- Doctorate in Philosophy Chemistry and Specialization Chemical and Environmental Toxicology

Cyclical review period:

- 2015-2016

Date:

- 26 August 2022

General comments:

On 23 June 2022, the Chemistry graduate program was provided the External Review as part of our cyclical program evaluation. We were extremely pleased with the positive evaluation of our program. We are committed to providing outstanding training and research, and were gratified that the external reviewers deemed our MSc and PhD programs excellent; that “student satisfaction was high” and that they reported no major issues with the program, the learning objectives and outcomes, the courses or management of the programs. Their report makes five recommendations, three being considered high priority. We value the recommendations and believe that addressing them will further strengthen our graduate program. Those recommendations and our response appear below.

Recommendation 1: (High priority) Setting and announcing the schedule for graduate courses for the academic year well before September is recommended. Furthermore, the Department may also wish to examine creating specific codes for Advanced Topics courses, to enhance program visibility to external students considering graduate studies at uOttawa.

Unit response: Agreed unconditionally. Graduate courses offered for the upcoming academic year must be available in the Registrar’s timetable when it becomes public at the beginning of May, for graduate students in the program to register, and for entering graduate students to consider the training they would receive by coming to uOttawa. The Registrar’s deadlines for course postings (in February for spring/summer courses; mid-March for fall/winter courses), precede the departmental May 1 deadline for assigning teaching workloads. We will study the feasibility of changing our departmental schedule of operations to better coordinate teaching assignments with posting of offered courses.

Assigning graduate course teaching as early as February would be greatly facilitated by input from a Graduate Curriculum Committee, as proposed in Section C4 of our Self-Evaluation document. This committee, to be established immediately, will determine the frequency with which core and specialized graduate courses should be offered over a two-year cycle. The committee will also ensure that regularly-offered graduate courses are assigned unique course codes and titles that provide explicit information about their content, to enhance visibility to current and prospective students.

Decanal response: Agreed unconditionally. The Department’s emphasis on agility has been an asset under some circumstances (e.g., an impressive number of grad courses was offered at very short notice in response to COVID shutdowns in spring 2020), but balance is required. Integration of graduate courses into formal teaching workloads, a change that occurred this cycle, strengthened course offerings. The plan to coordinate on postings is an excellent next step to enable students to plan, and to inform their faculty mentors. The proposed new Curriculum Committee will further strengthen oversight and planning.

Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
1	A Graduate Curriculum committee will be established to provide oversight on the content of our graduate teaching program, and to determine, in consultation with the Department, what courses we <i>want</i> to offer as a Department over a two-year cycle.	Graduate Director	Oct. 2022	No
2	The Graduate Director will coordinate with the Department Chair and Graduate Office to ensure grad courses are submitted to the Registrar’s office in compliance with the Registrar’s deadline.	Graduate Director, Department Chair, Graduate Office	Jan-Feb 2023	No
2	Once decisions are made by the Curriculum Committee on which Special Topics graduate courses should be offered regularly, unique course codes with relevant, informative course titles will be introduced to replace the “Special Topics” course codes. Faculty members will draft the required Minor Modification requests, with assistance from the Graduate Administrator and Graduate Director	Faculty members, Graduate Administrator, Graduate Director	Commencing W2023; ongoing exercise	Minor modification

* PRIORITY LEVEL: 1. URGENT-IMMEDIATE ACTION REQUIRED 2. IMPORTANT-ACTION REQUIRED WITHIN 18 MONTHS (MAXIMUM) 3. ADVISED: DEVELOPMENT AND STRATEGY-ACTION TO BE DISCUSSED AND MUST BE IN PLACE BY MID-CYCLE (WITHIN 4 YEARS)

Recommendation 2: (High priority) Continue the efforts to develop a new program or concentration in "Biomolecular Science" aligned with the areas of research strengths in the Department.

Unit response: Agreed unconditionally. These recommendations align with many of those outlined in the Self-Study (Section H1).

Decanal response: Agreed unconditionally. I am pleased to report that the recommended Concentration has now been approved at the MSc level; work on the PhD-level Concentration is under way. Prior to moving ahead on creating an independent graduate degree, the unit will wish to carefully assess whether the new Concentration enables them to compete with other programs elsewhere, and the impact on resources and workloads of an independent graduate degree.

Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
1	The concept of a graduate-level Concentration in biomolecular sciences will be re-examined immediately, beginning with departmental consultation this Fall.	Departmental champion	Sept 2022	No
2	Following departmental consultation, a Major Modification Request for a MSc-level Concentration will be put forward to the Faculty and ultimately the Senate, as proposed in Section H1 of our Self-Study.	Chair, Departmental champion, Graduate Director, Graduate Office, Vice-Dean	Fall 2022/ Winter 2023	Yes
2	A subsequent Major Modification Request for a PhD-level Concentration will be put forward to the Faculty and ultimately the Senate, as proposed in Section H1 of our Self-Study.	Chair, Departmental champion, Graduate Director, Graduate Office, Vice-Dean	Winter 2024	Yes
3	A letter of intent for the creation of an independent graduate degree in Biomolecular Sciences was submitted in 2019 (as indicated in the Self-Study, Section A4). An update on this initiative will be requested.	Chair	Sept 2022	No

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Recommendation 3: (High priority) Review the make-up of the Thesis Advisory Committee so that the supervisor does not have sole responsibility for selecting members.

Unit response: Agreed in principle. This recommendation stems from a misunderstanding that requires clarification. The external reviewer’s report states: “The Department may wish consider a model where the Supervisor (or the graduate student) does not have the responsibility of selecting members of their Thesis Advisory Committee. An incoming student is unlikely to have the expertise to populate the TAC objectively [but there is a risk of... perceived] conflict of interest if this is done by the Supervisor exclusively.” **We agree both that incoming students would not have the expertise to select their TAC without guidance, and that the supervisor should not do so unilaterally.** However, the actual practice in place is collaborative: moreover, it specifies mechanisms to deal with conflict of interest, whether real or perceived. We outline the actions that we intend to take to make these mechanisms explicitly clear.

Decanal response: Agreed. The proposed actions will further reinforce communication on key procedural issues.

Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
1	A misunderstanding is evident from pp. 8, 12 of the reviewers’ report. Our practice for constitution of the Thesis Advisory Committee (TAC) in fact requires students to select their TAC members <i>in consultation with</i> their supervisor and co-supervisor: see p. 20 of our Graduate Program Review Self-Study. This information is provided in our Graduate Student Handbook. However, the reviewers’ comments underline the importance of further communicating the process. We will explain the process of TAC appointment as an explicit point during the orientation session for new students.	Graduate Director	Sept 2022	No
2	We agree with the external reviewers (p. 8 of their report) that students should have a clear understanding that they can always consult with the Graduate Director concerning changes to their TAC. This course of action must be clearly communicated to all students in our program. It will be emphasized and communicated more clearly in the next revision of the Graduate Handbook, and in orientation sessions.	Graduate Director, Graduate Office	Dec 2022	No

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Recommendation 4: (Medium priority) Ensure that mechanisms are in place and applied to facilitate the submission and evaluation of yearly reports, tracking of progression requirements, course completion, student publications, funding accomplishments, etc.

Unit response: Agreed in principle. Mechanisms to track student progress are already in place, but we will implement solutions to augment these further. Tracking individual student success exceeds our capacity at the departmental level.

Decanal response Agreed in principle. Chemistry has now introduced a convenient tool (the Gantt chart indicated below) to monitor progress. We will monitor uptake with an eye to expanding to other departments in the Faculty. The suggestion of tracking grad student publications and awards is also interesting, if it can be implemented within our existing resources. We will examine best practices elsewhere to determine feasibility.

Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
1	All students do in fact have access to milestones indicating their progress, including annual progress reports, via the online system (uOzone Student Center). The comprehensive exam and reports from annual meetings with the thesis advisory committee (TAC) were added in Fall 2022. Failure to meet milestones by the deadline results in registration being blocked for the subsequent term. We will explicitly inform students of this point, with appropriate screenshots, in the Graduate Handbook, in the orientation session for incoming graduate students, and in beginning-of-term “Welcome/Welcome Back” emails from the Grad Director.	Graduate Director	Sept 2022	No
2	From an operational perspective, milestones with specific deadlines would ideally be added automatically on admission; i.e. pre-populated in the student file in uoCampus when the student enters the program. At present the Grad Officer must enter these manually. Automation would streamline the process and eliminate risks of error or oversight. Student Affairs (Registrar’s Office) will be requested to automate “manual” milestones (establishment of the TAC, PhD comprehensive, annual TAC reports).	Graduate Office	May 2023	No
2	We will develop a Gantt chart as a tool by which individual students can <i>visualize</i> and track their timelines and progress toward degree completion. These milestones and deadlines (e.g., establishing the TAC, meetings with the TAC, submission of yearly reports, course completion, comprehensive exam, research proposal and thesis writing) are already published in the Graduate Handbook). All progress requirements will be captured as obligatory milestones in the Gantt chart. We will recommend to grad students and supervisors that the students present the Gantt charts at the beginning of their TAC meetings.	Graduate Director/Graduate Office	Dec 2022	No

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Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
2	We will follow up on suggestions that other Faculties have developed tools to enable tracking of publications and awards, and implement them if our resources permit.	Vice-Dean, Graduate Office	May 2023	No

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Recommendation 5: (Medium priority) Develop new strategies to recruit more francophone students.

Unit response: Agreed in principle. We appreciate the suggestion by the external reviewers that it may be fruitful for us to focus our recruiting efforts on francophone populations, given the unique bilingual experience offered by uOttawa. We propose to carry out an analysis of different francophone 'markets', to identify opportunities to enhance recruiting efforts that specifically target francophone students.

Decanal response: We fully endorse the efforts to support recruitment of francophone student, and analysis to identify the best mechanisms to put in place.

Priority Level*	Actions to be undertaken	Assigned to	Timeline	Curriculum change?
2	In the spirit of this recommendation, one of our annual recruitment events will take place in French to publicize the bilingual nature of our department to francophone students.	Graduate Student Recruiting Committee	Dec 2022	No
2	Experience shows that recruiting from both France and Quebec is difficult, owing to the differences in the graduate systems, including financial support and (for France) the duration of degrees. We will follow up on this suggestion by considering francophone institutions where the undergraduate training positions students for success in our graduate program. The recruitment committee will investigate, and report to the department on recruiting efforts in these markets that are anticipated to maximize mutual benefit.	Graduate Student Recruiting Committee	April 2023	No
1	Information to guide more general marketing strategies will be sought by developing a questionnaire for new students during their orientation session. They will be asked, for example, how they first learned about our program, and the chief factors in their decision regarding institutions for graduate school.	Graduate Director / Chemistry Graduate Student Association	Sept 2022	No

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