FOR APPROVAL

TO: Arts & Science Council

SPONSOR: Dwayne Benjamin, Vice-Dean, Graduate Education

CONTACT INFO: vicedeangraduate.artsci@utoronto.ca

DATE: March 13, 2019 for March 20, 2019

AGENDA ITEM: 4

ITEM OF BUSINESS:
Major Modification – Proposed Change to the Program Length of the Master of Science in Chemistry

JURISDICTIONAL INFORMATION:
The Arts & Science Council has delegated authority to approve modifications to existing degree programs that are defined in the University of Toronto Quality Assurance Process (UTQAP) as major modifications, such as changing the length of a degree program.

GOVERNANCE PATH:
1. Graduate Curriculum Committee – March 7, 2019 (for approval)
2. Arts & Science Council – March 20, 2019 (final approval)
3. Office of the Vice-Provost, Academic Programs (for information), in turn reported to the Committee on Academic Policy & Programs (for information) – May 8, 2019

The Office of the Vice-Provost, Academic Programs will also report this major modification to the Ontario Universities Council on Quality Assurance in the summer of 2019.

HIGHLIGHTS:
The Department of Chemistry proposes to amend the minimum program length of the Master’s program from six sessions to three sessions, to more accurately reflect the length of time that it takes students to complete the program.

While the official program length of the MSc as reflected in the SGS calendar is 6 sessions full-time, many students complete the program requirements within 12 months. This aligns with the length of time that they are in the funded cohort, and the Chemistry department’s efforts to responsibly and efficiently provide a valued thesis degree. Moreover, the program is designed to be completed in 3 sessions (2 half-courses, a research thesis, seminars and division-specific events) and the program learning outcomes reflect that, so this change will align program design and systems. In recognition
of the varied and unpredictable timelines of research in chemistry, the reduced minimum program length will not alter the academic and financial support (e.g. research assistantships) that the department offers to students whose M.Sc. studies continue beyond a third session.

This proposal has been developed in consultation with the Office of the Vice-Provost, Academic Programs.

**MOTION:**

a) THAT the change to the program length of the Master of Science in Chemistry, described in the attached proposal dated March 5, 2019, be approved effective for the academic year 2019-20.
University of Toronto
Major Modification Proposal:
Significant Modifications to Existing Graduate and Undergraduate Programs

This template should be used to bring forward all proposals for major modifications to existing graduate and undergraduate programs for governance approval under the University of Toronto’s Quality Assurance Process.

Program being modified:
Please specify exactly what program and which components of that are being modified; e.g., BA...specialist, major and minor components.

Masters

Proposed major modification:
Change to program length

Department/unit (if applicable):
Chemistry

Faculty/academic division:
Arts & Science

Dean’s office contact:
Sharon Kelly

Proponent:
Chemistry Graduate Studies Committee

Version date:
Please change as you edit this proposal.
March 5, 2019

1 Summary

• Please provide a brief summary of the change(s) being proposed as it relates to the current structure of the program.

We propose to amend the minimum program length of the Masters program as published in the SGS calendar from 6 sessions to 3 sessions to more accurately reflect the length of time that it takes students to complete the program.

This change is prompted by a September 2018 SGS memo which noted that SGS has been assessing the Balance of Degree fee incorrectly for students in some graduate units, including Chemistry. The Balance of Degree fee is charged when, at the conclusion of their program, a student has paid less than the minimum degree fee, which is based on the full-time program length and is the minimum amount of tuition that every student must have paid upon completion of the program prior to graduation. SGS began correcting this error in the fall, and a number of Chemistry students were charged, unexpectedly, a Balance of Degree fee (this fee was later reversed). We seek, then, to amend our approved program length to more accurately reflect MSc program completion times within the department.
2 Effective Date

September 2019

3 Academic Rationale

- What are the academic reasons for the change proposed, and how do they fit with the unit’s and division’s academic plans?

While the official program length of the MSc, as reflected in the SGS calendar, is 6 sessions full-time, many students complete the program requirements within 12 months. This aligns with the length of time that they are in the funded cohort (students are in the funded cohort in Year 1 of the MSc), and the Chemistry department’s efforts to responsibly and efficiently provide a valued thesis degree. Moreover, the program is designed to be completed in 3 sessions (2 half-courses, a research thesis, seminars and division-specific events) and the program learning outcomes reflect that, so this change will align program design and systems. A 2018 FAS study indicated the average completion time by MSc students is 1.5 years with a significant number completing all requirements in 1 year. Such variations are not unexpected in a research-thesis focused degree program. The department allows students to take up to two years to complete the degree in extenuating circumstances, with financial support beyond the first year provided by the student’s supervisor/PI.

The specific program requirements for the Chemistry MSc program are:
- **Coursework**: Students must successfully complete 1.0 graduate full-course equivalent (FCE) including at least 0.5 graduate half-course equivalent in chemistry.
- **Seminar**: Students must participate in a seminar program during the tenure of their MSc. Attendance and presentation of a seminar are mandatory in order to receive the credit.
- **Thesis**: Students must complete a thesis based on original research. The thesis is reviewed by the supervisor and one additional graduate faculty member and the student typically gives an oral public talk prior to a private oral defence.

Our department typically offers a 3-4 month summer internship for students transitioning from their BSc to their MSc. This also gives students significant momentum in their research and helps guarantee an on-time completion of the MSc with 12 months of formally starting their graduate degree. The emphasis on 12 months is also critical to an on-time completion of the PhD within the time allowed for the funded cohort (5 years total). Over 50% of our MSc students will go on to complete a PhD. The MSc is also a useful finishing point for many students intending to pursue professional degrees (biotechnology, law, medicine, nursing, teaching & education, business and management, etc).
4 Description of the Proposed Major Modification(s)

- Please describe in detail what changes are being proposed. Major modifications include changes to the program requirements that will significantly change what students will know and be able to do when they complete the program.
- Other major modifications that may be included are significant changes to admissions requirements, significant changes to faculty engaged in program and; a change to mode of delivery, change to the language of the program and offering the program at another location or institution.
- Please be explicit about how the learning outcomes have changed and include both previous and proposed learning outcomes or one version of the current learning outcomes with the new learning outcome in track changes. You may wish to use Appendices A and B.
- Describe how the modification reflects universal design principles and/or how the potential need to provide mental or physical health accommodations has been considered in the development of this modification.
- Please provide calendar copy, either in track changes or as two separate documents in appendices C and D as applicable.

The change proposed is a reduction in the official MSc program length from 6 sessions to 3 sessions (full-time). The degree requirements, the ability of students to complete these requirements and the program learning outcomes will not be affected by this change, as they are achievable within this time frame and, as noted above, Masters’ students completing their program within a year is a typical scenario/trend for the department, and was discussed in our recent UTQAP review, conducted in 2018.

This proposal has been prompted by a recent memo from School of Graduate Studies, concerning an error in how they have been calculating the balance of degree fee in previous years. Several of our November 2018 graduands who completed the MSc program before the approved program length were charged this fee, and we wish to rectify this in time for the November 2019 graduation.

5 Impact of the Change on Students

- Outline the expected impact on continuing students, if any, and how they will be accommodated.
- Please detail any consultation with students.

In recognition of the varied and unpredictable timelines of research in chemistry, the reduced minimum program length will not alter the academic and financial support (e.g. RA) that the department offers to students whose M.Sc. studies continue beyond a third session.
The change had been discussed via e-mail by a few of the November 2018 MSc graduands back in the fall. They would like the program length clarified both in the SGS calendar and the departmental website.

6  Consultation

- Describe the impact of the major modification on other programs and any consultation undertaken with the Dean and chair/director of relevant academic units.

There will be no impact on other programs.

This proposal was discussed by members of the Graduate Studies Committee, which includes research faculty members from each of the sub-disciplines and the three campuses (January 17, 2019).

7  Resources

- Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries and enrolment/admissions.
- Please be specific where this may impact significant enrolment agreements with the Faculty/Provost’s office.
- Indicate if the major modification will affect any existing agreements with other institutions, or will require the creation of a new agreement to facilitate the major modification (e.g., Memorandum of Understanding, Memorandum of Agreement, etc). Please consult with the Provost’s office (vp.academicprograms@utoronto.ca) regarding any implications to existing or new agreements.

None. As noted above, students who must continue beyond a third session for whatever reason will continue to receive academic and financial support from the department, as they currently do.

8  UTQAP Process

The UTQAP pathway is summarized in the table below.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Approvals</th>
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<tbody>
<tr>
<td>Development/consultation within unit</td>
<td></td>
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<tr>
<td>Consultation with Dean’s office (and VPAP)</td>
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Developed by the Office of the Vice-Provost, Academic Programs
Template last updated March 2, 2017
### 9 Appendix A: Current Learning Outcomes, and Degree-Level Expectations

Address how the design, structure, requirements and delivery of the program support the program learning outcomes and degree-level expectations.

<table>
<thead>
<tr>
<th>MASTER’S DEGREE LEVEL EXPECTATIONS (based on the Ontario Council of Academic Vice Presidents (OCAV) DLEs)</th>
<th>MASTER’S PROGRAM LEARNING OBJECTIVES AND OUTCOMES</th>
<th>HOW THE PROGRAM DESIGN AND REQUIREMENTS SUPPORT THE ATTAINMENT OF STUDENT LEARNING OUTCOMES</th>
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<tbody>
<tr>
<td><strong>EXPECTATIONS:</strong> This Master of Science in Chemistry is awarded to students who have demonstrated:</td>
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<tr>
<td>1. Depth and Breadth of Knowledge</td>
<td>Depth and breadth of knowledge is defined in the Chemistry MSc as a mastery of foundational knowledge. This is reflected in students who are able to: demonstrate a deep understanding in at least one sub-discipline in chemistry, forming the focus on their thesis research.</td>
<td>The program design and requirement elements that ensure these student outcomes for depth and breadth of knowledge are: Each MSc student takes 1.0 FCE of lecture-based graduate courses, is continuously enrolled in a seminar course, and typically works as a teaching assistant in an undergraduate course.</td>
</tr>
<tr>
<td>A systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the academic discipline, field of study, or area of professional practice.</td>
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</table>
| **2. Research and Scholarship**  
A conceptual understanding and methodological competence that i) Enables a working comprehension of how established techniques of research and inquiry are used to create and interpret knowledge in the discipline; ii) Enables a critical evaluation of current research and advanced research and scholarship in the discipline or area of professional competence; and iii) Enables a treatment of complex issues and judgments based on established principles and techniques; and, on the basis of that competence, has shown at least one of the following: i) The development and support of a sustained argument in written form; or ii) Originality in the application of knowledge. | Research and Scholarship is defined in the Chemistry MSc as the ability to formulate and test hypotheses about the composition, structure and properties of matter.  
This is reflected in students who are able to: survey the recent literature, and identify appropriate methods for synthesis and/or analysis. | The program design and requirements that ensure these student outcomes for research and scholarship are:  
Each student selects a graduate supervisor and learns about the techniques and methods applied in the research program from the supervisor and/or from other senior members of the research group, and from reading the peer-reviewed literature. |
| **3. Level of Application of Knowledge**  
Competence in the research process by applying an existing body of knowledge in the critical analysis of a new question or of a specific problem or issue in a new setting. | Application of Knowledge is defined in the Chemistry MSc as identifying a significant scientific problem and solving that problem through creative experimentation, data analysis, and evaluation.  
This is reflected in students who are able to: carry out independent research in synthetic, experimental, or theoretical chemistry. | The program design and requirements that ensure these student outcomes for level and application of knowledge are:  
The student carries out independent and original research and writes up their results in a thesis. The expectation is that the thesis contains sufficient knowledge that advances scientific understanding that it could constitute a peer-reviewed publication, though the work is not always published prior to graduation. |
| **4. Professional Capacity/Autonomy** | Professional Capacity/Autonomy is | The program design and requirements that ensure |
## Master’s Degree Level Expectations (Based on the Ontario Council of Academic Vice Presidents (OCAV) DLEs)

<table>
<thead>
<tr>
<th>Master’s Program Learning Objectives and Outcomes</th>
<th>How the Program Design and Requirements Support the Attainment of Student Learning Outcomes</th>
</tr>
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<tbody>
<tr>
<td>a. The qualities and transferable skills necessary for employment requiring i) The exercise of initiative and of personal responsibility and accountability; and ii) Decision-making in complex situations; b. The intellectual independence required for continuing professional development; c. The ethical behavior consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and d. The ability to appreciate the broader implications of applying knowledge to particular contexts.</td>
<td>defined in the Chemistry MSc as the ability to safely and responsibly perform research. This is reflected in students who are able to: plan and perform research in a safe way. these student outcomes for professional capacity/autonomy are: All MSc students receive mandatory department-wide health and safety training and are expected to be aware of and follow protocol for safety that are specific to their own research.</td>
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</table>

5. Level of Communications Skills
The ability to communicate ideas, issues and conclusions clearly.

| Communications Skills is defined in the Chemistry MSc as the written and oral dissemination of research results. This is reflected in students who are able to: present their research results in oral and written form. | The program design and requirements that ensure these student outcomes for level of communication skills are: Each MSc student is required to write a thesis and to deliver a seminar in which they report the results of their graduate research. The MSc thesis is evaluated by the supervisor and one other faculty member. Students will typically also present at less formal group meetings within their own group, and often present posters at conferences. |
Appendix B: Current Calendar Copy

Master of Science

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the department's additional admission requirements stated below.
- Appropriate bachelor's degree from a recognized university with an average equivalent to at least a University of Toronto B+.

Program Requirements

- **Coursework.** Students must successfully complete 1.0 graduate full-course equivalent (FCE) including at least 0.5 graduate half-course equivalent in chemistry.
- Students must participate in a seminar program every year. Attendance and presentation of a seminar are mandatory in order to receive the credit.
- Submission of a thesis.

Program Length

6 sessions full-time (typical registration sequence: F/W/S/F/W/S)

Time Limit

3 years full-time
Appendix C: Proposed Calendar Copy

Chemistry: Chemistry MSc

Master of Science

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the department's additional admission requirements stated below.
- Appropriate bachelor's degree from a recognized university with an average equivalent to at least a University of Toronto B+.

Program Requirements

- Coursework. Students must successfully complete 1.0 graduate full-course equivalent (FCE) including at least 0.5 graduate half-course equivalent in chemistry.
- Students must participate in a seminar program every year. Attendance and presentation of a seminar are mandatory in order to receive the credit.
- Submission of a thesis.

Program Length

3 sessions full-time (typical registration sequence F/W/S) 6 sessions full-time (typical registration sequence: F/W/S/F/W/S)

Time Limit

3 years full-time