



## Four Year Report (2023)

### Chemistry Graduate and Undergraduate Programs (reviewed 2017-19)

#### A. Summary of Review

1. This review was conducted under the terms and conditions of the IQAP approved by Senate on May 25, 2016.
2. The academic programs offered by the Department of Chemistry which were examined as part of the review were:

BSc (Honours) Chemistry
BSc (Honours) Chemistry Co-op
BSc (Pass) Chemistry
Minor in Chemistry
Combined (Honours) with Computer Science
Combined (Honours and Pass) with Biological Sciences, Earth Sciences, Mathematics, Physics
MSc Chemistry
PhD Chemistry

3. The Review Committee consisted of two external reviewers: Daniel Leznoff (Simon Fraser University) and Maria De Rosa (Carleton University) and an internal reviewer, Martin Kusy (Brock University).
4. The site visit occurred on May 13-15, 2019.
5. The Final Assessment Report was approved by Senate on December 11, 2019.

6. The reviewers assigned the programs the following outcome categories:

Program(s)	Excellent Quality	Good Quality	Good Quality with Concerns	Non-Viable
BSc (Honours) Chemistry		X		
BSc (Honours) Chemistry Co-op		X		
BSc (Pass) Chemistry		X		
Minor in Chemistry		X		
Combined (Honours) with Computer Science		X		
Combined (Honours and Pass) with Biological Sciences, Earth Sciences, Mathematics, Physics		X		
MSc Chemistry		X		
PhD Chemistry	X			

7. The next review of the undergraduate and graduate programs in the Department of Chemistry will be in 2025/26.

## B: Recommendations

### Recommendation #1

Reduce the onerous load on the 2<sup>nd</sup> and 3<sup>rd</sup> year students in the Honours/Majors program by removing the two 2<sup>nd</sup> year Physics courses (two of PHYS 2P02, 2P20, 2P31, 2P50, 2P51) from the required curriculum.

#### ARC Disposition of the Recommendation

ARC considers the recommendation to be accepted and in the process of implementation.

#### Implementation Plan (1<sup>st</sup> Priority)

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2019/20

Actions Taken	Year Action Started	Year Action Completed
Action #1 The Department submitted a revised Undergrad Calendar (Sept 2019) having two 2 <sup>nd</sup> year Physics courses removed from the required curriculum.	2019	2019

#### Explanation of Actions Taken, Status and Results:

In September 2019 the Department submitted a revised Undergraduate Calendar that saw the removal of two 2<sup>nd</sup>-year Physics courses from the required Chemistry curriculum. This change has now been in place since 2019.

**Recommendation #2**

Reduce the number of explicitly required 3<sup>rd</sup> year CHEM courses in the Honours program and replace them with choices/options.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted for consideration.

**Implementation Plan (1<sup>st</sup> Priority)**

Responsible for approving: Department  
 Responsible for resources: Department  
 Responsible for implementation: Department  
 Timeline: Dean of Mathematics and Science to report by the end of academic year 2019/20

Actions Taken	Year Action Started	Year Action Completed
Action #1 The Department submitted a revised Undergrad Calendar (Sept 2019) having the number of explicitly required 3 <sup>rd</sup> year CHEM courses reduced by one.	2019	2019

**Explanation of Actions Taken, Status and Results:**

The number of explicitly required 3<sup>rd</sup>-year Chemistry courses required by students has been reduced by one; students are now only explicitly required to complete six 3<sup>rd</sup>-year courses rather than the pre-existing seven. An elective credit (0.5 weight) was added in place of the course that was removed. This is now reflected in the Course Calendar.

**Recommendation #3**

We recommend instituting weekly laboratory instruction for the 2nd term of 1<sup>st</sup> year Chemistry (i.e., 1P92).

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted for consideration. The Committee expects that the Department is best-positioned to determine the frequency of laboratory instruction and/or other experiential opportunities for students.

**Implementation Plan (1<sup>st</sup> Priority)**

Responsible for approving: Department  
 Responsible for resources: Department  
 Responsible for implementation: Department  
 Timeline: Dean of Mathematics and Science to report by the end of academic year 2019/20

Actions Taken	Year Action Started	Year Action Completed
Action #1 The tutorial and labs for 1 <sup>st</sup> year classes have been restructured.	2019	2020

**Explanation of Actions Taken, Status and Results:**

Students attend biweekly tutorials and laboratories and therefore they already have weekly experiential contact hours. Instituting weekly laboratories in CHEM 1P92 was not financially feasible. Students already have 15 contact hours of laboratory over the 12 weeks and 7.5 contact hours of tutorial over the 12 weeks.

**Recommendation #4**

Re-inaugurate an Undergraduate Chemistry Club, with some Departmental financial support and mentorship for student-organized social and professional events

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted for consideration. The Committee recognizes that the formation of a Student Club will require both initiative from the students and support from the Department. The Department is encouraged to work with the new Communications Outreach Officer in the Faculty.

**Implementation Plan (2<sup>nd</sup> Priority)**

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 This recommendation has been discussed at Dept. meeting.	2019	2019
Action #2 Speak with students.	2022	2022

**Explanation of Actions Taken, Status and Results:**

Implementation was delayed by the COVID pandemic. However, in September 2022 the Chemistry Club was revived and ratified by the Brock University Students' Union. The Club has met and is currently operating under the guidance of Dr. Poly Kyriacou with the support of the

Department. Guidance of the Chemistry Club has been added to the list of Departmental tasks to facilitate the continuity of the Club.

### Recommendation #5

Reduce the # of courses required for Ph.D. by one, and remove the sub-disciplinary course requirements at the Ph.D. level.

#### ARC Disposition of the Recommendation

ARC considers the recommendation to be accepted for consideration.

#### Implementation Plan (1<sup>st</sup> Priority)

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2019/20

Actions Taken	Year Action Started	Year Action Completed
Action #1 This recommendation has gone through a preliminary discussion discussed at a Dept. meeting.	2019	2019
Action #2 Discuss at future Dept. meetings.	2022	2022

#### Explanation of Actions Taken, Status and Results:

The Department voted to accept this recommendation. The appropriate Calendar changes were implemented and will come into effect in the 2023-2024 academic year.

### Recommendation #6

We recommend that the University continue to pursue funding for a substantial renovation of the Mackenzie teaching laboratory space.

#### ARC Disposition of the Recommendation

considers the recommendation to be not accepted as it lies outside of the Committee's jurisdiction. The Committee expects that the Department will proceed through normal channels of advocacy for the renovation of these space resources.

#### Implementation Plan

Recommendation not accepted

**Recommendation #7**

Upon retirement, the Tier I CRC Research Chair currently in the Chemistry Department should remain allocated to the Department, in order to help maintain its international research profile and to assist in continuing to attract top students.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as it lies outside of the Committee's jurisdiction. However, the Committee recognizes the importance of the Department maintaining its international research profile and attracting top students to its programs.

**Implementation Plan**

Recommendation not accepted

**Recommendation #8**

We strongly recommend that the two Physical Chemistry faculty that are due for retirement be replaced expediently with new faculty with expertise in Physical Chemistry, and that this intention be clearly communicated to the Department.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as it lies outside of the Committee's jurisdiction. The Committee expects that the Department will proceed through normal channels of advocacy for faculty renewal.

**Implementation Plan**

Recommendation not accepted

**Explanation of Actions Taken, Status and Results:**

Two Physical Chemistry faculty members were hired (January 2022 and July 2022) to replace the colleagues that have retired.

**Recommendation #9**

We strongly recommend that the "four-courses per year" teaching load include the teaching of seminar-type courses and the teaching and supervision of graduate and undergraduate research students, as is the norm at other universities (including the institutions of the reviewers), in recognition of the very substantial time and teaching effort required to provide this type of experiential instructional learning.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as it lies outside of the Committee's jurisdiction and has implications with respect to the Brock University/Faculty Association Collective Agreement. The Committee recognizes the importance of integrating experiential elements into the Department's programs and the commitment required to provide this type of instructional learning.

**Implementation Plan**

Recommendation not accepted

**Recommendation #10**

We very strongly recommend that an overall minimum graduate student stipend aggregated from all sources be clearly delineated for the entire two-year M.Sc. and four-year Ph.D. period of study, as is the norm at other schools.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as stated. The Committee understands that the funding available from various sources is subject to change over the course of the student's period of study. The Committee suggests that communication with the student should be as clear as possible about the base and additional funding possibilities available to them over the period of their program.

**Implementation Plan**

Recommendation not accepted

**Recommendation #11**

Graduate students who win external scholarships should gain a significant monetary benefit from them and not have their awards completely (or nearly completely) clawed back by a combination of the University and the Supervisor.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as stated. The Committee recognizes the underlying complexity of funding and possible inequitable outcomes for graduate students. The Committee suggests that communication with the student should be as clear as possible about the procedures associated with external scholarships and any implications they might have on other sources of funding.

**Implementation Plan**

Recommendation not accepted

**C. Unit Summative Analysis and Evaluation****1. To what extent has the Department achieved the improvements suggested by the reviewers?**

The Department was able, accounting for delays resulting from the COVID pandemic, to implement all of the accepted recommendations made by the reviewers.

**2. What overall impact has it had on the Department's programs?**

The accepted recommendations have made it possible to maintain, but not grow, the quality of the Department's programmes. An active Chemistry Club has provided students with not only a social focal point, but also added assistance with academics. The comments have also clarified for the Department the need to apply for growth in faculty numbers to aid in the development of new programmes at the graduate and undergraduate levels.

**3. Is the Department adopting a process of continuous quality improvement for its programs?**

The Department is in the process of developing a 10-year Strategic Plan that will help to guide the growth and improvement of the Department's programmes at both the undergraduate and graduate levels.

**4. How well do the programs now align with Brock University strategic priorities?**

The incorporation of the reviewers' comments has improved alignment with Brock's Strategic Priorities. The adjustments that were made to the graduate and undergraduate course requirements has moved the Department closer to offering a truly transformational and accessible university experience. By lessening the requirement for prescribed graduate courses the programme should look more attractive to applicants, and ideally increasing applications to the graduate programme.

**5. How does this review and its results position the programs as the Department moves into the next review cycle?**

The review has allowed the Department to address some of the concerns regarding workload as expressed by our students. Although not all of the external reviewers' comments were accepted, the recommendations from the reviewers have allowed the Department to review our existing courses/programmes and think about the development of new offerings. Coupled with this is the need to develop proposals for additional hires (in addition to replacements) that support the ideas and strategies to be incorporated into the Department's Strategic Plan to truly permit positive growth and incorporation of the University's Strategic Priorities.

**D. ARC Final Summary**

In final summary of the 2017-2019 cyclical academic review of the programs offered by the Department of Chemistry, ARC has determined the following:

1. That the Reviewers' Recommendations have been addressed satisfactorily.
2. That the Department has established a direction for next steps as it prepares for the next review cycle.
3. That the Department has achieved a broad-based, reflective, and forward-looking self-assessment.