



Four Year Report (2023)

Biological Sciences

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 Biological Sciences which were examined as part of the review were:

PhD Biological Sciences
MSc Biological Sciences
BSc (Honours) Biological Sciences
BSc (Honours)/BEd Biological Sciences
BSc (Honours) Biomedical Sciences
BSc (Honours) Biochemistry
BSc (Honours) Biochemistry Co-op
BSc with Major in Biological Sciences
BSc (Pass) Biological Sciences
BSc (Pass) Biochemistry
Combined (Honours and Pass) in Biological Sciences with: Chemistry, Geography, Mathematics, Psychology, Earth Sciences, Physics
Minor in Biological Sciences

3. The Review Committee consisted of two external reviewers: Joanna Freeland (Trent University) and Suha Jabaji (McGill University) and an internal reviewer, Joanne Crawford (Brock University).
4. The site visit occurred on January 6-8, 2019.
5. The Final Assessment Report was approved by Senate on October 9, 2019.

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

Program(s)	Excellent Quality	Good Quality	Good Quality with Concerns	Non-Viable
PhD Biological Sciences		x		
MSc Biological Sciences		x		
BSc (Honours) Biological Sciences		x		
BSc (Honours)/BEd Biological Sciences		x		
BSc (Honours) Biomedical Sciences		x		
BSc (Honours) Biochemistry		x		
BSc (Honours) Biochemistry Co-op		x		
BSc with Major in Biological Sciences		x		
BSc (Pass) Biological Sciences		x		
BSc (Pass) Biochemistry		x		
Combined (Honours and Pass) in Biological Sciences with: Chemistry, Geography, Mathematics, Psychology, Earth Sciences, Physics		x		
Minor in Biological Sciences		x		

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

B: Recommendations

Recommendation #1

Develop a strategic and business plans to ensure viability and sustainability of the department for the next 5-10 years. Consider new programs that could provide an additional revenue stream to the department. These could include a specialization in lab skills (i.e. Lab Skills Plus could become a minor/specialization that forms part of the students' degree (e.g. BSc in Biological Sciences with specialization in Laboratory Analyses) instead of the current practice which is to note its completion on student transcripts similar to a co-curricular record), and a course-based Master's that did not compete with the research-based Master's.

ARC Disposition of the Recommendation

ARC considers the general recommendation to develop a strategic and business plan to be accepted and in the process of implementation. The Committee understands that the Department is already investigating the idea of a Lab Skills Plus stream and is willing to consider the potential of developing a course-based option in the MSc program.

Implementation Plan (1st 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 Complete
Action #1 Lab Links.	2019	Ongoing
Action #2 Program development.	2020	SOIs approved in 2022

Explanation of Actions Taken, Status and Results:

1. Lab Links Skills Testing:

Lab Links skills testing gives students the opportunity to practice and document their laboratory skills to help them gain confidence in their laboratory skills and support their career goals. 43 modules were offered this year, and the program generated \$3190.

Value to the Department and University:

- Opportunity for students to gain experience in essential, transferable skills and techniques required for upper-year courses and a career in the life sciences.
- Demonstrates that Brock is an institution committed to student success and is a great PR opportunity for the University.
- Provides co-op students the opportunity to learn important hands-on laboratory skills before representing Brock in their work placements.

2. Science Start Program:

Science Start is a 5-week transition to university course for grade 12 students entering a degree program with a biology component. The program provides students with a combination of lessons, workshops, and lab tutorials, and aims to ensure that students have a strong understanding of science fundamentals and skills needed to be successful in university courses. 78 high school students participated in Science Start in 2022, and the program generated \$10,030.

Program Feedback:

Students were given the option to provide anonymous general feedback about the program and sample responses are included below:

- “WOW! What an amazing program! Not only do I feel more comfortable in a lab and discovered a love for lab work, I also met people within my program and have started to build relationships. I loved all of the hands-on learning with the virtual component. Everyone was more than willing to help and answered any questions I had. Would definitely recommend to incoming undergrads.”
- “I loved it. I enjoyed meeting other Brock students. The staff were approachable, and I was comfortable asking questions...I feel more prepared for my courses.”

Value to the Department and University:

- Science Start is being used at recruitment events to demonstrate that Brock is an institution committed to the success of its graduates.
- Science Start is ideal for international students to take online before coming to Canada.

- The program was converted into a hands-on program that generated revenue for the Department.

3. Let's Talk Science:

Brock has partnered with an organization called Let's Talk Science to provide students in Niagara with educational experiences that inspire students to pursue STEM education and careers. School and community groups can participate in free hands-on workshops at Brock or in their classrooms to gain hands-on experience relating to the curriculum by conducting experimental projects. We have reached 112 elementary and high school students, of which 14 are underprivileged. Brock has also been successful in Let's Talk Science grant applications and received \$7650 to support the program. During the first half of this term (before reading week) we have close to 20 school and community group visits scheduled. I believe that we could do close to 75 before the end of the school year.

Program Feedback:

- "Alysha and Alex presented an amazing lesson and experiments for the students that perfectly aligned with the curriculum. The students had a great time, and the learning will continue." - Grade 7 DSBN teacher
- "The Let's Talk Science Workshop provided our high-school students with an amazing hands-on learning experience. The facilitators did an excellent job engaging our students." - Community Outreach Staff Member

Value to the University and Department:

- This program provides students with a unique and practical introduction to science at Brock University.
- This program provides a solution to teachers who are limited to activities they can conduct in the classroom due to resources and equipment.
- Demonstrates that Brock University is an institution committed to promoting STEM in the community and to underprivileged groups.

4. Lab Links FMS Mentorship:

We were approached by the Dean's office to offer a hands-on training program for high school FMS mentorship students. This program was developed in 2022 and took place over 2-days in the laboratories at Brock University. 12 high school mentorship students participated in the program free of charge.

Value to the University and Department:

- Introduces local high school students to laboratory equipment and practices at Brock University.
- Prepares students for their co-op placement by giving them the skills and training needed to be successful.

Future Plans:

- Develop an advanced Lab Links CRISPR genome editing module. This module will focus on skills required for many biotechnology jobs and be ideal for collaborations with Co-op.
- Offer Science Start as a regular program that runs every summer. Increase the number of students that participate in Science Start in-person by recruiting in local high schools.

- Increase the number of elementary and high school students reached through the Let's Talk Science Program. We currently have 17 educators interested in Let's Talk Science classroom visits in Winter 2023.
- Apply for NSERC PromoScience funding to support and expand Lab Links programming.

Action #2 Program developments

The Department presented 2 Statements of Intent (SOIs) to the University for proposed new programs: "BSc in Applied Ecology" and "BSc in Cannabis Sciences".

We are currently preparing the Program Proposal Briefs (PPBs) for both programs. The Applied Ecology program will be cross listed with Geography & Tourism Studies. The Cannabis Sciences program will be housed in Biological Sciences.

The SOIs for these programs were submitted (and approved of) in 2022. The Applied Ecology program has the greatest probability of success because we already have a strong base of ecologists in the Department and would require one more tenure-track hire. The Cannabis Sciences program would require at least three new tenure-track hires and may not be as easy to implement given the current financial climate at Brock.

During the last cycle, the idea of a course-based MSc in Biological Sciences was not deemed to be of high priority, but this is something that the Department is now willing to reconsider.

Recommendation #2

Acquire additional academic staff

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 continue to advocate through normal channels for staff resources.

Implementation Plan

Recommendation not accepted.

Explanation of Actions Taken, Status and Results:

The Biological Sciences Department has hired new faculty members with specialties in Plant Physiology, Virology, Ecology, and Neuroscience. We have collaborated with the Department of Computer Science to hire a CRC Tier 2 position in Computational Biology. The Department has collaborated with the new Yousef Haj-Ahmad Department of Engineering to create a new faculty position in Sustainable Agriculture Engineering. The Department has created new lab space in what was previously a lunchroom and storage room. The Department is identifying candidates for a Developmental Biologist (backfill of retiree) and a CRC Tier 1 position in Synthetic Plant Biology. We will be able to increase our undergraduate and graduate student enrolments, knowing we can meet their needs. We are increasing our recruitment efforts and have innovative programs in development. We will be increasing our grant applications and expect to see concomitant increases in indirect research cost funding from the Tri-Agencies.

Recommendation #3

Develop a user fee plan to ensure the sustainability and functions of research equipment while enhancing teaching lab options.

ARC Disposition of the Recommendation

ARC considers the recommendation to ensure the sustainability and functions of research equipment to be already current practice. The Committee understands that the Department is well-aware of its options when it comes to the best use of its equipment for both research and teaching, including the possibility of user fees.

Implementation Plan

Already current practice. No action required.

Explanation of Actions Taken, Status and Results:

We have continued to collect lab fees and we have also developed the Lab Links program, both of which have enhanced the quality of the lab experience Biological Sciences students have during their labs while keeping equipment functional and current.

Recommendation #4

Create an administration HUB (service point) to streamline administration support

ARC Disposition of the Recommendation

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

Implementation Plan (1st 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 Streamline administrative support.	2020	Ongoing

Explanation of Actions Taken, Status and Results:

A staff member was hired in the Faculty of Mathematics and Science to look after the needs of graduate students in all programs administered by Biological Sciences. We have also hired two Administrative Assistants in Biological Sciences and (for the 2022-23 academic year) an Administrative Assistant for the Neuroscience program housed in Biological Sciences. In addition, two undergraduate Academic Advisors were hired by the former Dean of FMS; however, one position appears not to have been renewed. A short-term solution to the administrative toll on our large first year classes' senior lab demonstrator has been to hire someone to answer all

student accommodation requests, including the rescheduling of labs, rescheduling of midterms, etc. This has relieved much of the administrative burden from our program directors by our administrative team directly responding to and prioritizing student needs.

Recommendation #5

Track your undergraduate and graduate employment status.

ARC Disposition of the Recommendation ARC considers the recommendation to be accepted and in the process of implementation. The Committee encourages the Department to consult and coordinate with relevant Faculty and campus-wide resources such as Alumni and Donor Relations.

Implementation Plan (1st 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 Track undergraduate and graduate employment status.	2023	Delayed

Explanation of Actions Taken, Status and Results:

Due to staffing in the Office of Alumni Relations, we have been unable to track this information as Alumni Relations only collects self-reported data.

Recommendations from the original reviewers’ report stated:

The Department would benefit from more information on their graduates, and the university is encouraged to provide resources that would help them to achieve this goal.

This has not happened and therefore, we still do not have proper information on our graduates.

Members of the Biological Sciences Department have not attempted to track this citing privacy concerns and a lack of formal permissions from former graduates to use their data. We feel strongly that there ought to be a mechanism at the Institutional level to get the appropriate permissions from graduating students to allow us to report on their graduate employment status.

Recommendation #6

Facilitate the ability of students to communicate concerns directly to the Chair by giving them representation at departmental meetings and on search committees.

ARC Disposition of the Recommendation

ARC considers the recommendation to be accepted and in the process of implementation. The Committee understands that this has been past practice for the Department.

Implementation Plan (1st 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 Recruit student representatives.	2022	Ongoing

Explanation of Actions Taken, Status and Results:

The Department of Biological Sciences has recruited two graduate student representatives and two undergraduate student representatives. The student representatives attended the Departmental Retreat in May 2022 and gave valuable student insight into program and course content. The Department is incorporating the student representatives in Faculty searches. The Department will continue to involve the student representatives in Department meetings, search committees and departmental retreats.

Recommendation #7

Develop opportunities for graduate students to be exposed to international research experience

ARC Disposition of the Recommendation

ARC considers the recommendation to expose graduate students to international research experience to be current practice. The Committee encourages the Department to advertise this more effectively to students as they may not be fully aware of these opportunities.

Implementation Plan

Current Practice.

Although ARC considered this to be current practice, it is not evident in any of our departmental documentation that graduate students are exposed to international research experiences. This is on a case-by-case basis and depends on the supervisor and his/her research collaborations. It should not be considered common practice.

Should the University wish this to be current practice, there needs to be financial support for this so that graduate students can have international research experiences. Without Institutional support, this will remain on a case-by-case basis depending on the supervisor’s collaborations and grant monies. Thus, the Department is not able to advertise this.

Recommendation #8

Provide clarity on the budget model and provide assurance that the five pending faculty retirees will be replaced with tenure-track faculty.

ARC Disposition of the Recommendation

ARC considers the recommendation to be not accepted as it lies outside of the Committee’s jurisdiction. The Committee understands that clarity on the budget model and faculty renewal would begin with the Dean’s Office as the Faculty budget is administered by the Dean.

Implementation Plan

Recommendation not accepted.

Recommendation #9

Merge Biology and Biotech graduate programs

ARC Disposition of the Recommendation

The Committee understands that folding the two standing programs into one might not be the only solution to issues with resources. ARC considers the recommendation to merge some resources for the two programs to be accepted

Implementation Plan (2nd 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 Engage in discussions with Chemistry to merge Biotech with Biology.	2020	2020

Explanation of Actions Taken, Status and Results:

Merging Biological Sciences and Biotechnology programs is not feasible. The Biotechnology program was approved as a joint program comprising Chemical Biotechnology and Genetic Biotechnology, both components are needed for the program and removing one nullifies the

other. Course load is split between both departments while Chemistry also handles much of the administrative load of the program. The directorship usually switches between departments, but currently CHEM is handling the directorship, thesis coordination, and graduate seminar coordination while the graduate program director is from BIOL. The joint program also increases graduate student and undergraduate student numbers in both departments and is mutually beneficial.

Informal discussions among Biotechnology (BTEC) faculty in 2020 concluded that this was not a viable option.

Recommendation #10

Streamline university calendar to better reflect which courses are offered annually or biannually.

ARC Disposition of the Recommendation

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

Implementation Plan (1st 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 Review course collection and prune out courses no longer offered.	2022	Ongoing

Explanation of Actions Taken, Status and Results:

The Department of Biological Sciences is reviewing which courses can be terminated and which courses can be offered biennially. We expect to implement these changes starting Fall/Winter 2023. We intend to plan a couple of years into the future, so that students will know when they might be able to take certain courses. This information will then be added to the Departmental website.

Recommendation #11

The administration provide funding for a Departmental retreat to allow faculty and staff to conduct a thorough assessment of the department (including curriculum, workloads, future plans), to boost morale, and to identify ways in which colleagues can be more supportive and collaborative

ARC Disposition of the Recommendation

ARC considers the recommendation to undertake a Departmental retreat to be accepted. The Committee does not accept the recommendation that the administration provide funding as this lies outside of its jurisdiction. It is expected that the Department will proceed through normal channels of advocacy for the resources required.

Implementation Plan (1st 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 Have a departmental retreat to discuss issues.	2022	2022

Explanation of Actions Taken, Status and Results:

The Department of Biological Sciences held a retreat on May 10, 2022 at Balls Falls Conference Center with 36 people in attendance. The Department discussed staffing updates, program development, enrolment, co-curricular activities, and learning systems.

C. Unit Summative Analysis and Evaluation

1. To what extent has the Department achieved the improvements suggested by the reviewers?

There are still some areas that are lacking, including tracking the successes of our graduates. Faculty do not have the time to do this and without institutional support, this is likely not going to happen in the near future.

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

Positive. We are being rejuvenated especially with the new hires.

- 3. Is the Department adopting a process of continuous quality improvement for its programs?**
We intend to keep reviewing the programs as more faculty come on board and faculty retire. However, there is still the problem of too many courses being taught by sessional instructors and the Department (as a whole) not having a good overview of how all of the courses come together for the program. We have posted the course curricula for all of the core courses (on a departmental Sharepoint site) so that all faculty are aware of what is being taught. Many faculty have never looked at these files, so there is a sense that individual faculty are working in their own silos. In 2022-23 more team teaching of BIOL 1P91 and 1P92 has been implemented to bring other faculty into the core. We shall continue to do this so that all faculty are involved in the core and not just their own specialized courses.
- 4. How well do the programs now align with Brock University strategic priorities?**
We are especially good in experiential learning and our proposed new Applied Ecology program should strengthen the goals of the University.
- 5. How does this review and its results position the programs as the Department moves into the next review cycle?**
Positively. We have a benchmark for moving forwards.

D. ARC Final Summary

In final summary of the 2017-2019 cyclical academic review of the programs offered by the Department of Biological Sciences, 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.