



# Four Year Report (2024)

## BSc Sciences Undergraduate Program (reviewed 2019-20)

### 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 Review Committee consisted of two external reviewers: Shantanu Basu (University of Western Ontario) and Tricia Carmichael (Windsor University) and one internal reviewer, Bareket Falk (Brock University).
3. The site visit occurred on June 16-17, 2020, via video conference.
4. The Final Assessment Report was approved by Senate on November 18, 2020.
5. The academic programs offered by the Faculty of Mathematics and Science which were examined as part of the review are listed below, with the reviewers having assigned the following outcome categories:

Program (s)	Excellent Quality	Good Quality	Good Quality with Concerns	Non-Viable
BSc Sciences (Honours)		X		
BSc Sciences (Pass)		X		

6. The next review of the BSc Sciences program will be in 2027/28.

## B: Recommendations

### Recommendation #1

Empower a faculty member to be a champion for FMS 1P00 and revamp the course to balance the content to include topics in numeracy, writing, information literacy, professional skills, presentation skills, and EDI [Equity, Diversity, Inclusion] issues in STEM.

#### ARC Disposition of the Recommendation

ARC considers the recommendation to be accepted for consideration. The Committee recognizes the importance of this course to the program and the high value placed on it by the reviewers. While it may not be possible for this one course to deliver all of the additional content suggested by the reviewers, ARC encourages the program to consider how it might provide students with connections to existing campus resources which promote the topics listed.

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

Responsible for approving:	Program
Responsible for resources:	Program
Responsible for implementation:	Program
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 EDI [as of 2022 called IDEA] page under development.	2020	2022
Action #2 Looking for a faculty member to promote the course.	2020	2024

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

Action #1: Some action was taken by 2022, but the FMS IDEA/DEI policy is still in development. It should be noted that the policy is relevant to FMS administration, but is not framed in such a way as to be useful in FMSC 1P00.

By 2023, FMSC 1P00 had basically evolved into a remedial math course, rather than a course about transitioning to university science, with the course content not really reflecting the course description. Part of the reason for this disconnect is that the BSc Sciences program has not had oversight or direction from a curriculum committee or from permanent FMS faculty, an issue that we will now address. In Fall 2023 we revised the undergraduate calendar description for the course and for the BSc Sciences program as a whole, to provide better context for the objectives of the program. As of Fall 2024, the course will be offered as part of load by a tenured professor. The course will now be a required course for first year BSc Sciences students, giving all new students in the program, the opportunity to benefit from the new content and approach.

Here is the new course description:

**FMSC 1P00**

**Transitioning to University Science**

Science as a way of knowing. Scientific method, scientific theories, hypothesis testing and prediction. Empirical, observational and theoretical approaches to science. Data management, analysis, and visualization. Principles of science communication and contrasts with other knowledge systems.

**Recommendation #2**

Augment student advising by increasing academic advising time and providing pathways for students in the form of program templates geared toward specific employment outcomes. Use outcome data to continually update and improve templates and pathways to better advise students.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted and in the process of implementation. Although hiring is outside the jurisdiction of the Committee, ARC recognizes that the program is working on ways to augment student advising in addition to advocating for additional advising resources.

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

Responsible for approving:	Program
Responsible for resources:	Program
Responsible for implementation:	Program
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 Application for a dedicated advisor for the program was made to the HRC [Hiring Review Committee].	2020	2023
Action #2 Various pathways for students in the program are being developed.	2020	2024

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

As of Summer 2023, FMS has completely revised its approach to undergraduate advising. There are now 3 permanent, full-time Academic Advisor positions, reporting to the Associate Dean, Undergraduate Programs. Since many BSc Sciences students are shadowing degree programs in Biological and Computer Sciences, two of the advisors place special emphasis on the BSc Sciences program. We are pleased that the advising situation has now stabilized in FMS, after 3-4 years of constant change and insufficient capacity.

As a direct result of the conversion of our Academic Advisor positions to permanent, full-time status, we have already seen positive results for the BSc Sciences program. Academic Advisors were aware of several issues in the BSc Sciences Calendar entry, which was causing considerable anxiety and confusion to students. In response to student requests, in Fall 2023, the Undergraduate Calendar Entry for 2024-2025 was updated to provide more specific guidance on course choices for the BSc Sciences. Students can also shadow other programs (such as Biological and Computer Sciences), using the specific course templates for those programs.

**Recommendation #3**

Develop a robust method to track outcomes for BSc Sciences students to provide a better understanding of student outcomes and aid in program improvement.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted and in the process of implementation. The Committee understands that the unique nature of the program will require some time to develop a robust method to track outcomes.

<b>Implementation Plan (2<sup>nd</sup> Priority)</b>	
Responsible for approving:	Program
Responsible for resources:	Program
Responsible for implementation:	Program
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2021/22.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Tracking of students has been initiated.	2021	2022

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

As pointed out in previous reports, we do not have the human, time, or financial resources to track students after graduation. However, Institutional Planning, Analysis and Performance (IPAP) has provided various reports about students’ progress through the program, but we do not have a precise understanding of completion rates. We do know that these are lower than for Major programs, which is expected as many students move into this program due to lack of academic success in other programs. Nevertheless, we have also learned from IPAP, that of the three general degree programs (in FMS, Humanities, and Social Sciences), completion and retention seems to be higher in BSc Sciences.

It is clear that this program needs centralized curriculum oversight led by an academic director (a permanent, tenured faculty member) who can focus on the academic objectives of the program, supported by a curriculum committee that will provide input, insight, and annual assessments of how the program is functioning. While such oversight may not have been

necessary previously or at the time of the last review, the program has grown very quickly and is now the second largest in FMS, with >500 students, considerably larger than it was at the time of the previous review. As a result, conditions are quite different currently than they were at the time of the review, therefore FMS will be considering strategies to revise and realign the program, with clarified and relevant objectives. This process began in 2023 with an initial revision to the calendar. The next step, beginning Spring 2024, is to create a curriculum committee composed of faculty from across FMS departments to consider new directions and priorities.

Beginning in Spring 2024, one of the advisors will be embarking on a special project, summarizing what we know about the experiences of BSc Sciences students with a view to providing us with a better picture of pathways chosen by students in this program, including graduation and retention rates. This information will also be helpful for our planned update of the program objectives.

### C. Unit Summative Analysis and Evaluation

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

We consider that the most important messages conveyed by the reviewers were 1) that the program required a “champion”, and 2) Improvements to Academic Advisor capacity.

1) In earlier reports, the word “champion” was interpreted to refer to the instructor of FMSC 1P00, but since 2023, FMS has realized that this narrow interpretation was resulting in increasing academic isolation of the BSc Sciences program from other programs with which it shares students (especially Biology and Computer Science, two programs that themselves are quite independent of each other). We have now considerably improved the program calendar entry, and as of Fall 2024, we are launching a revision of the first year FMSC 1P00 course much more in line with the recommendations of the reviewers, and which will provide some clarity to students of their program objectives.

2) The lack of advising capacity for BSc Sciences, which developed as a result of financial constraints and the replacement of permanent advisor positions, with temporary positions, has been fully addressed. Positive impacts of the increased advising capacity have already been realized.

#### 2. What overall impact has it had on the program?

The major impact is that we have begun a comprehensive process of improvement for the program which was not underway until 2023. This includes assignment of a faculty instructor for FMSC 1P00 beginning in Fall 2024 who will teach and coordinate the course for the next several years, a change to program requirements in which FMSC 1P00 is now a required course for entering BSc Sciences majors, and the creation of a curriculum committee for the program. Perhaps most importantly, FMS is now committed to active oversight and development of the program, with input from faculty in all Major programs, with a new objective for the program of creating a truly general science degree. Positive impacts on the program should become measurable in 2024.

#### 3. How is the Program adopting a process of continuous quality improvement?

Beginning Spring 2024, FMS will create and convene a curriculum committee composed of faculty from across FMS departments to consider new directions and priorities for the

program. This committee will meet twice a year to consider student success in FMSC 1P00 and in upper years, as well as retention and graduation rates. We need this information to improve the program.

**4. How well does the program now align with Brock University strategic priorities?**

Most relevant is the Strategic Priority to offer a transformational and accessible academic and university experience. The program currently emphasizes accessibility, in the sense that it provides opportunities for obtaining a BSc Sciences degree for students who might not otherwise qualify. We want to go beyond this definition of accessibility and provide a real focus on Science as a way of knowing. We want more students to join the general program because its primary objective is an academic focus on interdisciplinary science, rather than its current focus as a tool for improved student retention. In short, we want to aim at providing a transformational experience in the future.

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

The plans for improvement over the next two years should position the program for an evaluation focused on renewed and revised intellectual and learning objectives in the next cycle.

## **D. ARC Final Summary**

In final summary of the 2019/20 cyclical academic review of the BSc Sciences program offered by the Faculty of Mathematics and Science, ARC has determined the following:

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