Four Year Report (2024)
Mathematics and Statistics
Graduate & Undergraduate Programs
(reviewed 2017-2019)

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: Javad Mashreghi (University of Laval) and Grace Yi (University of Western Ontario) and an internal reviewer, Jason Liu (Brock University).

3. The site visit occurred on February 23-25, 2020.

4. The Final Assessment Report was approved by Senate on October 28, 2020.

5. The academic programs offered by the Department of Mathematics and Statistics 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
MSc	X			
BSc (Honours and Pass)		X		
BSc (Honours) Co-op	X			
BSc (Honours) combined major	X			
BSc (Honours)/BEd	X			
Minor		X		

6. The next review of the undergraduate programs in the Department of Mathematics and Statistics will be in 2026/27.

B: Recommendations

Recommendation #1

Solidify the current Master's program and possibly create a new Master's program.

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 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 Submit request for 3 faculty positionsoutlined in the Self-Study.	2020	2020
Action #2 Begin planning a new MSc in Data Science.	2021	Ongoing

Explanation of Actions Taken, Status and Results:

Action 1: We submitted the request for three faculty positions in 2020. We were approved for all three hires, and they were completed successfully (two in 2021, one in 2022).

Action 2: We started planning for a Professional MSc program in Data Science in 2021, which was planned to be joint with Computer Science. We applied for, and received, funding from the Provost's office to support launching the program. In 2022, Computer Science withdrew from the proposal, citing a lack of resources (faculty members) available to support the new program. The funding from the Provost's office has expired. We are currently investigating the possibility of launching the program within the Department of Mathematics and Statistics.

Recommendation #2

Find a strategy to keep track of students' employment information after their graduation.

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 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 Create a plan to track information about graduates of the Department's BSc and MSc programs.	2023	Ongoing

Explanation of Actions Taken, Status and Results:
Data about graduates is collected centrally at Brock through the Office of Development and Alumni Relations. We are in contact with them and have requested relevant data about our alumni from our undergraduate programs (since 2001) as well as our graduate program (since 2007). We plan to continue updating the data annually.

Once received, data will be shared with the Department through Sharepoint, and our departmental Outreach Committee will be asked to use it to propose initiatives to the department, e.g. a summary on our department webpage.

Recommendation #3

Create a collegial environment and adopt a common long-term vision for the department.

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 strategies to improve collegiality and a common vision.

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 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 Discuss and approve improvements to the Department's existing Rules of Procedure so that governance is more transparent, consultative, inclusive, and accountable.	2020	Ongoing
Action #2 Get advice from the Dean's office and HRE on steps to promote and support the University policies for a respectful workplace and collegial behaviour.	2020	2022
Action #3 Add a department rule stating that all committees, including the Department Assembly, will keep minutes that will be posted to a Sharepoint folder; and that all committees will submit to the Department Assembly a report every term on their activities.	2020	2020
Action #4 Hold a department meeting to develop a long- term vision.	2023	Ongoing

Explanation of Actions Taken, Status and Results:

Action 1: We have been continually updating our Rules of Procedure each year. Since 2020, we have made the following changes:
- Clarified voting rights of members
- Clarified quorum
- Clarified voting procedures
- Removed limits on years of committee service
- Instituted Robert's Rules for departmental meetings
- Added rules around conduct during meetings
- Added a requirement for committees to keep minutes and submit term reports
- Added a section on the duties and role of the Graduate program director
- Added a graduate admission policy
- Expanded our rules around priority for visiting scholars

In addition, in 2023 the Department approved a 2-year co-chair arrangement based on a proposal to improve transparency and inclusiveness.

Action 2: A Climate Review of the Department was initiated by Human Rights and Equity (HRE) in 2020. The resulting report, including recommendations to improve collegiality,

was completed and shared with members in 2022. Several items mentioned in the report have been completed, others have been initiated. Overall, there has been good progress on improving collegial behaviour. This is confirmed by a recent survey (Fall 2023) in which no member disagreed with the statement, "The collegial atmosphere has improved compared to a year ago.". There is still work to be done on this Action, and the Chair's office is planning to strike a committee to review the status of the report recommendations in 2024-25.

Action 3: This item was completed in 2020. In 2023, the Department approved the notion of a "major" committee, and the rule was updated to focus these efforts on committees deemed to be of high importance by members. This change has allowed the Department to better focus its service efforts on items most important to the Department Assembly.

Action 4: This item was initiated in summer 2023 by the incoming co-chairs. An ad-hoc major committee (Strategic Vision Committee - SVC) was struck to guide and facilitate the process of getting a vision approved by the Department. To date, the SVC had 5 meetings in Fall 2023, and has brought several recommendations to the Departmental Assembly. This work is planned to be completed by the end of the Winter 2024 term.

Recommendation #4

Create a series of weekly (or biweekly) seminars.

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 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 Create a weekly or bi-weekly seminar series.	2023	Ongoing

Explanation of Actions Taken, Status and Results:
Although a bi-weekly seminar series was not implemented in 2020-2023, we have held a small number of seminars since 2019 (around 3-4 annually). A recurring issue identified in these seminars that hinders our attempt to establish a regular seminar series is that attendance is generally low. Our Graduate Program Committee is currently considering a program change to

include a requirement for MSc. students' seminar attendance. If this change is approved, it will solve the attendance issue, and provide the foundation for a regular seminar series.

For a smaller department such as ours, it would be difficult to have visiting scholars every other week. Our planned seminar series may include presentations by our faculty and graduate students, as well as virtual presentations hosted by external scholars, e.g. from the Fields Institute.

Recommendation #5

Increase the visibility of department at the provincial and national level.

ARC Disposition of the Recommendation
ARC considers the recommendation to be accepted and in the process of implementation. The Committee expects that the Department is best-placed to determine strategies to increase the visibility of 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 2020/21

Actions Taken	Year Action Started	Year Action Completed
Action #1 Support efforts by faculty members to host major research workshops/conferences at Brock.	2020	Ongoing
Action #2 Continue to nominate faculty and staff for internal awards at Brock.	2020	Ongoing
Action #3 Nominate faculty and staff for National awards as appropriate.	2020	Ongoing

Explanation of Actions Taken, Status and Results:
The Department continues to encourage and support members to host workshops and conferences, and nominates them for internal and external awards as appropriate. This recommendation will be ongoing indefinitely. Below, we list examples for the three actions items.

    Action 1: Here is the list of events hosted at Brock by members of our department in the past 4 years:

- International Society for Business and Industrial Statistics (ISBIS) Satellite Conference, July 13-14, 2023. Funded by ISI and ISBIS. Attendance: ~75, including international scholars.

- Coding, Computational Modeling and Equity in Mathematics Education Symposium + PD-Day, April 26-29, 2023. Funded by Fields Institute, SSHRC, and Calysto. Attendance: ~105, including international scholars.

- Online Seminar Series on Programming in Mathematics Education, June to August 2020. Funded by Mathematics Knowledge Network (Ontario Ministry of Education) and SSHRC. Attendance: ~260, including international scholars

- International Conference on Management Science and Engineering Management, August 2019. Funded by International Society of management science and Engineering Management (ISMSEM). Attendance: ~100.

Our department has also been hosting for over 30 years the annual regional meeting of the school mathematics teachers (attendance around 110 teachers). No meetings took place during the pandemic. We started hosting them again this last Spring in April 2023.

Action 2: Here is the list of nominations and awards in the past 4 years:

- Chantal Buteau: Brock University Distinguished Teaching Award, 2023.
- Chantal Buteau: Brock FMS Distinguished Research Award, 2022.
- Yuanlin Li: Brock FMS Distinguished Research Award, 2021.
- Neil Marshall: Brock FMS Student Experience, Recruitment and Outreach Award, 2020
- Basil Nanayakkara: Brock FMS Council Excellence in Teaching & Student Engagement Award, 2019

Action 3: No member has been nominated for a national award in the past 4 years. However, there was an international award:

- S. Ejaz Ahmed: Bualuang ASEAN Chair Professorship Award at Thammasat University (Thailand), 2019

Recommendation #6

Engage a Canada Research Chair, Tier II, in Data Science.

ARC Disposition of the Recommendation
ARC considers the recommendation to be not accepted as it lies outside the jurisdiction of the Committee. However, the Committee recognizes that the Department is open to the possibility and encourages any efforts to advocate through normal channels for such a position.

Implementation Plan
Recommendation not accepted.

Explanation of Actions Taken, Status and Results:
Although this recommendation was not accepted, the Department applied for a CRC Tier II Chair in Data Science in 2021 and 2022. The applications were not successful, and the Department is now incorporating this item into its current discussion about a Strategic Vision.

C. Unit Summative Analysis and Evaluation

1. **To what extent has the Department achieved the improvements suggested by the reviewers?**
   Only a few of the actions were finite - those have been completed. The rest of the actions have no specific ending, but rather are a process that should be ongoing and continually approved. Overall, the Department has initiated and continues to address all five recommendations and achieved the improvements suggested by the reviewers.

2. **What overall impact has it had on the Department's programs?**
   The Statistics program is strengthened by our new faculty members (Recommendation 1.1), and the Data Science BSc and PhD have had successful launches. We are planning to use the alumni data (Recommendation 2.1) in recruitment, which should have a positive impact on enrollment. The improved collegiality (Recommendation 3.2) has a large indirect impact, as everything benefits when we work together in a constructive manner.

3. **How is the Department adopting a process of continuous quality improvement for its programs?**
   The Department has always implemented a continuous process for quality improvement. Although still ongoing, it is clear that the strategic vision (Recommendation 3.4) will be useful to highlight priorities for the Department to target on its path to improvement and growth. In addition to the rule to keep minutes (Recommendation 3.1), we have also included a rule that each major committee should indicate a yearly goal for improving some aspect of our programs (guided by our strategic vision). This process is supported by our improved collegiality (Recommendation 3.2).

4. **How well do the programs now align with Brock University strategic priorities?**
   Our programs are well aligned with Brock University's strategic priorities. Some key areas worth highlighting:
   a. Offer a transformational and accessible academic and university experience (Recommendation 1.1 and 1.2 - Data Science faculty and programs)
   b. Build research capacity across the University (Recommendation 4.1 - research seminars, Recommendation 5.1 - 5.3 - research activities and awards)
   c. Nurture a culture of research and creative excellence (Recommendation 5.2, 5.3 - research, teaching, and service awards).
   d. Foster a culture of equity, inclusivity, diversity, accessibility (Recommendation 3.1, 3.2).

5. **How does this review and its results position the programs as the Department moves into the next review cycle?**
   The current review has several aspects that help us understand the current state of the program, and where it can grow. Specifically, Recommendation 2 helps us to better understand our graduates, and Recommendation 3.4 prompts us to think of the future. As we enter the next review cycle, we will be on our way to figuring out the future of the

Department, and the review will happen at a crucial time to provide constructive feedback to that process.

D. ARC Final Summary

In final summary of the 2017-19 cyclical academic review of the programs offered by the Department of Mathematics and Science, 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.