

YORK UNIVERSITY

**Final Assessment Report – Executive
Summary**

**Mathematics & Statistics, Undergraduate
(BA, BSc)**

Faculty of Science

Cyclical Program Review – 2015 to 2021

This Final Assessment Report (FAR) provides a synthesis of the cyclical review of the programs listed below.

Program(s) Reviewed:

Actuarial Science - BA
Professional Certificate in Actuarial Science
Applied Mathematics - BA, BSc
Mathematical Biology - BSc
Mathematics for Education - BA, BSc
Mathematics - BA, BSc
Statistics - BA, BSc

Reviewers appointed by the Vice-Provost Academic:

W. John Braun, Professor and Head, Department of Computer Science, Mathematics, Physics and Statistics, University of British Columbia-Okanagan, British Columbia

Bei Hu, Professor and Director of MS Program, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, Indiana, USA

Philip Kelly, Professor of Geography, Associate Dean for Research, Graduate and Global Affairs, Faculty of Environmental & Urban Change, York University

Cyclical Program Review Key Milestones:

Cyclical Program Review launch: September 16, 2020
Self-study submitted to Vice-Provost Academic: October 11, 2021
Date of the Site Visit: March 7-9, 2022
Review Report received: May 20, 2022
Program Response received: July 20, 2022
Dean's Response received: October 6, 2022

Implementation Plan and FAR confirmed by Joint Sub-Committee on Quality Assurance, May 2023.



Submitted by Lyndon Martin, Vice-Provost Academic, York University

This review was conducted under the York University Quality Assurance Protocol, August 2020.

SITE VISIT: March 7-9, 2022

A virtual site visit for the undergraduate programs in the Department of Mathematics and Statistics in the Faculty of Science took place in conjunction with the review of the Department's graduate programs as well as with the undergraduate program in Mathematics at Glendon College. Meetings for the undergraduate programs in the Faculty of Science took place with the following individuals and groups:

- Vice-Provost Academic, Lyndon Martin
- Dean, Faculty of Science, Rui Wang
- Associate Dean, Students, Michael Scheid
- Chair, Department of Mathematics & Statistics, Stephen Watson
- Undergraduate Program Director, Hyejin Ku
- Program directors for Pure Math, Applied Math, Math for Education, Mathematical Biology and the Dual Degree program
- Full-time faculty members
- Part-time instructors
- Students
- Administrative Staff
- Jack Leong, Associate Dean, Research and Open Scholarship, York University Libraries

OUTCOME:

The Joint Sub-Committee on Quality Assurance received the Program and Decanal responses to the recommendations and has approved an implementation plan.

A report on the progress of the initiatives undertaken in response to recommendations in general and as specified in the implementation plan will be provided in the Follow-up Report which will be due 18 months after the review of this report by the York University Joint Sub-Committee on Quality Assurance (in February 2025).

The next Cyclical Program Review will begin in the Fall of 2028 with a site visit expected in the Fall of 2029 or Winter of 2030.

PROGRAM DESCRIPTION AND STRENGTHS:

The Department, situated in York University's Faculty of Science, offers bachelor's degrees in six areas: Actuarial Science, including a Professional Certificate in Actuarial Science, Applied Mathematics, Mathematical Biology, Pure Mathematics, Mathematics for Education, and Statistics. A new program in Data Science launched in 2023.

The actuarial science programs were established in 2017, growing out of a strong actuarial science stream of the mathematics program as a response to the previous cyclical review. The self-study notes that the objectives of the program "revolve around the education of the future generations of Actuaries and, more generally, of

quantitatively savvy Risk Management and Insurance (RMI) professionals”. The curriculum aligns with the professional curriculum of the Society of Actuaries (SOA).

The Applied Mathematics option includes BA and BSc programs, as well as a stream in Financial Mathematics, available as part of the Specialized Honours option. The self-study describes the program as follows: “The Applied Mathematics Program aims to give students a strong qualitative and quantitative background in subjects outside of pure mathematics, coupled with a solid base of knowledge of mathematical theory and techniques which has important applications in computer science, psychology, economics, business, and other fields.”

The Mathematics for Education program, established between the 2009 and 2015 cyclical reviews, is focused on the needs of students interested in teaching with mathematics as a teaching subject. The self-study states, “This program ensures a broad background in mathematics and encourages students to develop a wide perspective on mathematics and on the teaching and learning of mathematics.”

The Mathematical Biology program was first offered in 2016 and is “concerned with the mathematical representation, treatment and modelling of biological processes, using a variety of mathematical techniques and tools.” Students have knowledge in biology and, as described in the program’s self-study, “will be able to reduce a complex biological issue to a key question, determine an appropriate mathematical model to describe/reflect this biological process, analyze the model with mathematical theory and numerical methods, produce mathematical results, interpret the results in terms of the original biological question, and identify areas where the mathematical model can be refined and expanded.”

The emphasis of the Pure Mathematics program is “the understanding of concepts, abstraction and reasoning; these then become the tools for problem solving, as well as the language and environment in which problems are solved.” Graduates of this program often continue on to graduate programs.

The Statistics program, in existence since the mid 80’s, trains students in modern statistical methodology and underlying theory. The program was accredited in 2017 which means that students completing the required courses can obtain the status of Professional Associate Statistician from the Statistical Society of Canada.

The reviewers note that some faculty members in the Department “enjoy research credentials that put them near the top, nationally” and that the university should celebrate the achievements of these professors more so that the public is aware of this valuable resource.

The reviewers caution about “silo-ing” within the Department and suggest that the unit consider multidisciplinary or trans-disciplinary approaches, allowing student to study two or more fields. Such an approach may ease enrolment burdens in some areas and bolster others.

All programs provide experiential learning opportunities, ranging from opportunities offered by the curriculum through to the internship opportunities offered through the office of Science Academic Services in the Faculty of Science. All programs participate in offering summer research projects for undergraduate students such as those supported by NSERC.

The “Gauss Lab”, York’s Advanced Multimedia Lab, supports courses with a significant computing component and, when no classes are scheduled, is open for general student use.

In their report, the reviewers offer five formal recommendations, as outlined below. They also made a number of additional thoughtful insights and suggestions throughout the body of their report that the Department and the Dean responded to with further comments and plans. These were not included as formal recommendations by the reviewers, but the program and Dean are urged to continue their consideration of these ideas, as indicated in the implementation plan below. The suggestions include increasing domestic and international student recruitment efforts, developing 3+1+1 programs to offer international students a pathway to a master’s degree, increasing the program’s emphasis on statistics and data science and ensuring adequate resourcing to support this emphasis, ensuring strong support for the Actuarial Science and Mathematical Biology programs, and ensuring greater access to the Mathematical Biology program via increased marketing and outreach.

IMPLEMENTATION PLAN

The chart below lays out the implementation plan approved by the Joint Sub-Committee at its meeting in May 2023.

	Recommendation	Action	Responsible for Follow-up	Timeline
1.	That the high school entrance requirements for Mathematical Biology be reconsidered.	The program should consider the prerequisites for Mathematical Biology and ensure adequate advising is available.	Chair and Undergraduate Program Director	Changes in place for Fall 2024.
2.	That the Department increase cooperation within the unit.	The Department should continue with efforts to increase synergistic opportunities within the Department and plans for interdisciplinary degrees.	Chair and Undergraduate Program Director	Discussions underway throughout 2023. Plan in place by Winter 2024.
3.	That the Department explore joint and collaborative opportunities with other programs at York.	The Department should continue with efforts to increase synergistic opportunities with other departments at York.	Chair and Undergraduate Program Director	Discussions underway throughout 2023. Plan in place by Winter 2024.
4.	That additional administrative support be provided to the undergraduate program director.	An Operations Manager was hired in Fall 2022 who will conduct an review workload issues for changes and adjustments.	Dean's Office, Executive Officer	Completed
5.	That service teaching be adequately recognized by the Department.	The Department should consider plans for service teaching in faculty complement requests going forward. Incentives for large course loads will continue to be offered.	Chair, Dean's Office	Ongoing
6.	That the Department continue with plans for the suggestions	Departmental plans and discussions should continue regarding additional	Chair	Discussions to take place in Summer

	made throughout the body of the review report in addition to the formal recommendations.	suggestions made by the reviewers, particularly those that relate to recruitment.		and Fall 2023, with plans for implementation to follow. Ongoing.
--	--	---	--	--