

DATE: April 17, 2020

TO: Senate

FROM: Dr. Dwight Deugo, Vice-Provost and Associate Vice-President (Academic), and Chair,
Senate Quality Assurance and Planning Committee

RE: Final Assessment Report and Executive Summary: Undergraduate Programs in
Nanoscience

The purpose of this memorandum is to request that Senate approve the Final Assessment Report and Executive Summary arising from the cyclical review of the undergraduate programs in Nanoscience.

The request to Senate is based on a recommendation from the Senate Quality Assurance and Planning Committee (SQAPC), which passed the following motion at its meeting of April 16th, 2020:

THAT SQAPC recommends to SENATE the approval of the Final Assessment Report and Executive Summary arising from the cyclical program review of the undergraduate programs in Nanoscience.

The Final Assessment Report and Executive Summary is provided pursuant to articles 4.2.5-4.2.6 of the provincial Quality Assurance Framework and article 7.2.23 of Carleton's Institutional Quality Assurance Process (IQAP). Article 7.2.23.3 of Carleton's IQAP (passed by Senate on June 21th, 2019 and ratified by the Ontario Universities Council on Quality Assurance on November 22nd, 2019) stipulates that, in approving Final Assessment Reports and Executive Summaries 'the role of SANC and Senate is to ensure that due process has been followed and that the conclusions and recommendations contained in the Final Assessment Report and Executive Summary are reasonable in terms of the documentation on which they are based.'

In making their recommendation to Senate and fulfilling their responsibilities under the IQAP, members of SQAPC were provided with all the appendices listed on page 2 of the Final Assessment Report and Executive Summary. These appendices constitute the basis for reviewing the process that was followed and assessing the appropriateness of the outcomes.

These appendices are not therefore included with the documentation for Senate. They can, however, be made available to Senators should they so wish.

Any major modifications described in the Action Plan, contained within the Final Assessment Report, are subject to approval by the Senate Committee on Curriculum, Admission, and Studies Policy, the Senate Quality Assurance and Planning Committee (SQAPC) and Senate as outlined in articles 7.5.1 and 5.1 of Carleton's IQAP.

Once approved by Senate, the Final Assessment Report, Executive Summary and Action Plan will be forwarded to the Ontario Universities' Council on Quality Assurance and to Carleton's Board of Governors for information. The Executive Summary and Action Plan will be posted

on the website of Carleton University's Office of the Vice-Provost and Associate Vice-President (Academic), as required by the provincial Quality Assurance Framework and Carleton's IQAP.

Senate Motion April 24, 2020

THAT Senate approve the Final Assessment Report and Executive Summary arising from the Cyclical Review of the undergraduate programs in Nanoscience.

**CARLETON UNIVERSITY COMMITTEE ON
QUALITY ASSURANCE
Cyclical Review of the undergraduate programs
in Nanoscience
Executive Summary and Final Assessment Report**

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's undergraduate programs in Nanoscience are provided pursuant to the provincial Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP).

EXECUTIVE SUMMARY

The undergraduate programs in Nanoscience reside in the Department of Chemistry, a unit administered by the Faculty of Science.

As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.12).

The External Reviewers' report offered a very positive assessment of the programs. Within the context of this positive assessment, the report nonetheless made a number of recommendations for the continuing enhancement of the programs. These recommendations were productively addressed by the Director of the Nanoscience Program, the Chair of the Department of Chemistry, the Dean of the Faculty of Science in a response to the External Reviewers' report and Action Plan that was submitted to SQAPC on April 16th, 2020.

FINAL ASSESSMENT REPORT

Introduction

The undergraduate programs in Nanoscience reside in the Department of Chemistry, a unit administered by the Faculty of Science. This review was conducted pursuant to the Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP). As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.12).

The site visit, which took place on September 23rd and 24th, 2019, was conducted by Dr. John Capobianco, Concordia University and Dr. Mark MacLachlan, University of British Columbia. The site visit involved formal meetings with the Provost, the Vice-Provost and Associate Vice-President (Academic), the Dean of the Faculty of Science, and the Director of Nanoscience. The review committee also met with faculty members, staff, and undergraduate students.

The External Reviewers' report, submitted on October 18th, 2019 offered a very positive assessment of the program.

This Final Assessment Report provides a summary of:

- Strengths of the programs
- Challenges faced by the programs
- Opportunities for program improvement and enhancement
- The Outcome of the Review
- The Action Plan

This report draws on five documents:

- The Self-study developed by members of the Nanoscience Program and the Department of Chemistry (Appendix A)
- The Report of the External Review Committee (Appendix B).
- The response and action plan from the Director of Nanoscience (Appendix C)
- The Response from the Dean of the Faculty of Science (Appendix D).
- The internal discussant's recommendation report (Appendix E).

Appendix F contains brief biographies of the members of the External Review Committee.

This Final Assessment Report contains the Action Plan (Appendix C) agreed to by the Director of Nanoscience and the Dean of the Faculty of Science for the implementation of recommendations for program enhancement identified as part of the cyclical program review process.

The Action Plan identifies who is responsible for implementing the agreed upon recommendations, as well as the timelines for implementation and reporting.

Strengths of the programs

General

The External Reviewers' Report states that "This is a unique inter-faculty program in which students take a mixture of chemistry and electrical engineering courses as well as other breadth courses. The program builds on existing faculty strength in Chemistry and Electrical Engineering to build a cohesive program in the area of nanoscience" (p. 1).

Faculty

Speaking with regard to faculty, the external reviewers' stated: "Faculty involved in this program are productive researchers who are dedicated to teaching and pedagogy. They have strong records of scholarly publication and external funding, and strong training records of undergraduate and graduate training. Their labs offer excellent opportunities for training at the undergraduate level – labs are modern and well-equipped" (p. 2).

Students

The external reviewers noted that "We met with half of the students in the B. Nanoscience program and we were impressed with the way in which the students articulated the challenges and quality of the program. It was evident that the students were pleased with the education that they are receiving in the program" (p.2).

Curriculum

The external reviewers noted that the "course program established for the Bachelor of Nanoscience program includes the breadth and depth of courses expected for a degree in this field. The program includes experiential learning through diverse lab components in chemistry and nanoscience. The complement of courses in both chemistry and electrical engineering serve to provide the students with a fundamental understanding of the field as well as a grounding the applications" (p. 1).

Opportunities for program improvement and enhancement

The External Reviewers' Report made 6 recommendations for improvement:

1. Improve the student cohort experience by branding the Bachelor of Nanoscience program (**opportunity**).
2. Faculty involved in the program should meet with the Bachelor of Nanoscience students once per term as a group (**weakness**).
3. A faculty member involved in the Bachelor of Nanoscience program should be identified to the students as an advisor (**concern**).
4. Efforts should be made to incorporate more bio, energy, and environmental nanoscience into the program to attract more students (**opportunity**).
5. Engineering should set aside seats for the Bachelor of Nanoscience students and streamline the entry process for these students to take their courses (**weakness**).
6. Greater efforts should be made to advertise this program to high school students. High school students are not aware of nanoscience (**opportunity**).

The Outcome of the Review

As a consequence of the review, the undergraduate programs in Nanoscience were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of **GOOD QUALITY** (Carleton's IQAP 7.2.12).

The Action Plan

The recommendations that were put forward as a result of the review process were productively addressed by the Director of the Department of and Nanoscience and the Dean of the Faculty of Science in a response to the External Reviewers' report and Action Plan that was considered by SQAPC on March 19th, 2020. The Department agreed unconditionally to all recommendations.

It is to be noted that Carleton's IQAP provides for the monitoring of action plans. A midway report is to be submitted by the academic unit(s) and Faculty Dean(s), and forwarded to SQAPC for its review by September 30th, 2021.

The Next Cyclical Review

The next cyclical review of the undergraduate programs in Nanoscience will be conducted during the 2025-26 academic year.

Department/School/Institute Name

Unit Response to External Reviewers' Report & Action Plan

Programs Being Reviewed: B.Sc. Nanoscience

Approved by Dean: February 24th, 2020

Note: This document is made available for public posting on the Vice- Provost's website.

Introduction & General Comments

The review committee's comments were positive and helpful. In general, the themes of these comments were to try to build a sense of community within the program, among the undergraduates and the instructors, as well as to increase efforts at recruiting.

In general, all recommendations are agreed to unconditionally. Please see below.

Calendar Changes

If any of the action items you intend to implement will result in calendar changes, please describe what those changes will be. To submit a formal calendar change, please do so using the Courseleaf system.

UNIT RESPONSE AND IMPLEMENTATION PLAN

Programs Being Reviewed: Nanoscience

External Reviewer Recommendation & Categorization	Action Item	Owner	Timeline	Will the action described require calendar changes? (Y or N)
1. Improve the student cohort experience by branding the Bachelor of Nanoscience program.	We will be having semester meet and greets with all Nanoscience students at the beginning of the Fall and Winter terms. In the Fall, the program Advisor will introduce himself and talk about protocol for booking appointments.	<i>Undergraduate Advisor, (Nanoscience and Chemistry)</i>	<i>Immediately</i>	<i>No</i>
2. Faculty involved in the program should meet with the Bachelor of Nanoscience students once per term as a group.	See recommendation 3.	<i>Undergraduate Advisor, (Nanoscience and Chemistry)</i>	<i>Ongoing</i>	
3. A faculty member involved in the Bachelor of Nanoscience program should be identified to the students as an advisor.	The advisor for the program will arrange a meeting in January 2020 between the students of the Nanoscience program, and the key instructors of the program. This meeting will be to discuss the expectations of the program, ensure that the students know	<i>Undergraduate Advisor, (Nanoscience and Chemistry)</i>	<i>Ongoing</i>	<i>No</i>

	<p>the key instructors and their areas of research (for potential CHEM 4908 thesis research projects), and to meet each other. Here, the students will be informed that Seán Barry is the current advisor for the program.</p>			
<p>4. Efforts should be made to incorporate more bio, energy, and environmental nanoscience into the program to attract more students.</p>	<p>Administrator of the Carleton nanofab FANSSI has undertaken a redesign of the keystone courses in the Nanoscience program (CHEM 3600: Introduction to Nanotechnology and CHEM 4103: Surfaces and Nanostructures). Given the feedback from the program review, he will strengthen the themes of bio, energy, and environmental nanoscience in these courses.</p>	<p><i>Facility Administrator, NanoFab FANSSI</i></p>	<p><i>Immediately</i></p>	<p><i>No.</i></p>
<p>5. Engineering should set aside seats for the Bachelor of Nanoscience students and streamline the entry process for these students to take their courses.</p>	<p>We have been in discussions with the Electronics Department in Engineering on how to set up the courses to allow Nanoscience students in without requiring special permission. The Undergraduate Administrator will continue to correspond with the Department throughout the timetabling process.</p>	<p><i>Undergraduate Program Administrator</i></p>	<p><i>Immediately</i></p>	<p><i>No.</i></p>

<p>6. Greater efforts should be made to advertise this program to high school students. High school students are not aware of nanoscience.</p>	<p>This year the Chemistry Department will be hosting the first NanoDay. This day is designed to teach high school students who are interested in Chemistry more about the fields of Nanoscience and Nanotechnology. This outreach event is for students in Grade 11 Chemistry or Grade 12 who are interested in studying Science at Carleton University, or who are passionate about Chemistry and would like to learn more about Nanoscience and the programs Carleton University has to offer. This year we will be accepting 45 high school students from the Ottawa Area. We will use the outcome of this year's event decide on the size and scope of future Nanoscience outreach events.</p>	<p><i>Maria DeRosa</i></p>	<p><i>March Break 2020</i></p>	<p><i>No.</i></p>
--	---	----------------------------	--------------------------------	-------------------