FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

ENGINEERING PHYSICS (UG) PROGRAM

Date of Review: March 28 – 29, 2023

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response, and assessments of the undergraduate program delivered by the Engineering Physics program. This report identifies the significant strengths of the program, together with opportunities for program improvement and enhancement, and it sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the Final Assessment Report; who will be responsible for providing any resources entailed by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations and who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

Executive Summary of the Review

In accordance with the Institutional Quality Assurance Process (IQAP), the Faculty of Engineering submitted a self-study in February 2023 to the Vice-Provost (Teaching and Learning) to initiate the cyclical program review of the Engineering Physics undergraduate program. The approved self-study presented program descriptions, learning outcomes, and analyses of data provided by the Office of Institutional Research and Analysis.

Two arm's length external reviewers and one internal reviewer were endorsed by the Dean, Faculty of Engineering and selected by the Vice-Provost (Teaching and Learning). The review team reviewed the self-study documentation and then conducted a virtual site visit on March 28 – 29, 2023. The visit included interviews with the Vice-Provost (Teaching and Learning), Deputy Provost, Dean of the Faculty of Engineering, Chair of the Department, Acting Associate Dean (Academic), and meetings with groups of current students, full-time faculty, and support staff.

The Dean of the Faculty of Engineering, and Chair of the Department submitted responses to the Reviewers' Report. The initial response was prepared by the program in August 2023, and finalized by the Dean in March 2024. Specific recommendations were discussed, and clarifications and corrections were presented. Follow-up actions and timelines were included.

- McMaster EP is traditionally strong in the general area of semiconductors and photonics/optoelectronics, and this area should not be neglected, especially in light of renewed interest in semiconductor fabs being located in North America. McMaster grads will have a role to play in this area.
- The McMaster nuclear program is also important, and a strength. The importance of having an on-campus reactor for such a program cannot be overstated. The impression of the reviewers was that this program could use a bit more resourcing, which should be a natural fit with Ontario's goal as a Province to advance on the SMR front.

Summary of the Reviewers' Recommendations with the Program's and Dean's Responses

Recommendation #1: Strengthen & enhance semiconductors
Department's Response and Actions to be Taken: We agree that there will be significant new opportunities in semiconductor device technology in response to the US Chips Act and ongoing technological advancement. This is of strategic importance to the Faculty and University – EngPhys is in an excellent position to take advantage of these opportunities and grow our research/educational programs in this area. We currently have several courses in this area with lectures and hands-on design and fabrication components that could be further refined for this purpose. There are also opportunities for greater synergy with the CEDT and its extensive fabrication facilities.
Dean's Response: I agree the opportunities in semiconductor device technology are of strategic importance to the Faculty and University, and I encourage the Department to explore opportunities with CEDT.
Recommendation #2: Strengthen Nuclear programs- new faculty hires
Department's Response and Actions to be Taken: We agree that there will be significant new opportunities in nuclear engineering related to refurbishment and possible growth of Ontario's nuclear fleet and continued interest in SMRs at the Provincial/Federal levels. This is of strategic importance to the Faculty and University, as is already well recognized – EngPhys is in an excellent position to take advantage of these opportunities and grow our research/educational programs in this area. This process is well underway with faculty renewal and growth, as well as increased collaboration with the MNR regarding education.

Dean's Response:
Nuclear technology holds strategic significance for both the Faculty and University. In the past year, the Faculty has recruited three tenure-stream faculty members specializing in Nuclear studies and is actively progressing towards establishing a minor in Nuclear Engineering. Additionally, there are plans under consideration to introduce further academic programs with a nuclear emphasis at both the graduate and undergraduate levels.

Recommendation #3: Expanding role of Eng Phys in Level 1

Department's Response and Actions to be Taken:
As we continue to work on recruitment from Level 1 into Engineering Physics, Level 1 participation remains a focal point. We agree that a greater presence in Level 1 could be helpful, but must be strategically chosen, based on our limited resources. Level 1 Physics continues to be a serious issue for us, because it gives Engineering students in Level 1 a poor impression of Physics as a discipline. This is also a concern Faculty-wide, because the students are not well served by the 2 Physics courses in their present form. We would like to have a greater role in these courses and will continue to advocate for that in various ways.

Dean's Response:
The Faculty has been working with the Department of Engineering Physics to understand the challenges associated with both Level 1 physics courses, which are offered through the Physics Department. Once we understand the challenges, we will be in a position to address them.

I think the Department's initiative helping level 1 students study for physics is an innovative way to foster engagement with these students. This provides them with valuable insights into the Department and its discipline.

Recommendation #4: Strengthen relationships with student Engineering Physics Society, consider having a student representative in the departmental meetings.

Department's Response and Actions to be Taken:
This issue goes a bit deeper in that the EngPhys Society has become weaker in the last several years, in part due to the pandemic. We hope to help rebuild it, while respecting its autonomy. It is important for the students to have a robust Society and it is also beneficial for the Department to have a robust Society to interact with.

Dean's Response:
I support the Department's proposed approach. Student societies play a vital role in fostering community, offering experiential learning opportunities, and serving as key points of contact for both the Department and Faculty. While it's crucial for these societies to maintain autonomy, occasional support from the Faculty is necessary.

Recommendation #5: Provide supports to instructors in managing academic accommodations.
Department's Response and Actions to be Taken: Evidently, this is a pervasive issue, and the Department will work with other units to support our instructors on this challenging issue.
Dean's Response: The frequency of academic accommodations has been steadily increasing, posing a significant burden on instructors' workloads, particularly in larger classes. This landscape is evolving and we hope to see better support for instructors from SAS soon. In the meantime, it has been suggested that integrating certain principles of Universal Design for Learning (UDL) could alleviate a substantial portion of the administrative burden associated with both SAS accommodations and MSAFs. To explore this hypothesis and evaluate the impact of UDL on student experience, the Associate Dean Undergraduate is launching a pilot project during the summer of 2024. This project aims to integrate UDL principles into an existing course through personalized meetings with an educational developer and the establishment of a community of practice among faculty members who are implementing UDL principles in their courses. The impact of these principles will be evaluated during the next course offering. I strongly encourage Engineering Physics to participate in this project to test these hypotheses. However, it should be emphasized that while UDL may help mitigate the need for some accommodations, it will not eliminate the necessity for SAS accommodations or MSAFs due to the diverse needs of learners. The primary goal of implementing UDL is to ensure that course materials and assessments are accessible across the spectrum of student diversity, enabling them to showcase their best work. Any reduction in administrative loads for instructors would be an additional benefit.
Recommendation #6: Revisit the question of having an Advisory Committee at the Department Level
Department's Response and Actions to be Taken: We do interact regularly with our stakeholders, and also think it would be good to formalize these interactions to some extent through an Advisory Board. We plan to consult to see if there is support and enthusiasm for this. It is important to use the time of our stakeholders wisely.
Dean's Response: Annual engagement with stakeholders is mandated by the Canadian Engineering Accreditation Board (CEAB)'s continuous improvement process. I concur that there are further opportunities to be leveraged with this group, and they should be thoroughly explored. Over the past year, the Associate Dean Undergraduate led a working group to develop a "Best Practices" guide tailored for department stakeholder groups to optimize the outcomes of these interactions. This guide is currently undergoing its final round of revisions and will be distributed to departments soon.

Recommendation #7: Improve communication between the Departmental Office and other offices on campus.
Department's Response and Actions to be Taken: While we generally agree with this recommendation, it does not appear to be actionable at the Department level.
Dean's Response: The university is in the process of implementing a CRM to establish an efficient, seamless method of sharing student-related information and communication across all offices on campus. The next phase of the CRM will integrate departments.
Recommendation #8: Keep an eye on the supplemental application process
Department's Response and Actions to be Taken: While we generally agree with this recommendation, it does not appear to be actionable at the Department level.
Dean's Response: The supplementary application is an important part of the admissions process that allows us to consider the whole applicant, rather than solely high school grades (which are ever increasing). The admissions process is handled jointly by the Registrar's Office and Associate Dean's Office.

McMaster University

Implementation Plan

In the chart below, please outline the recommendations made by reviewers, briefly outline the actions you plan to take, who will be responsible for leading the action, and a timeline for completion.

Recommendation	**Action(s) to be Taken**	**Responsibility for Leading Action** (specify the role(s) that will be responsible for each action item e.g. Program Chair.)	**Timeline for Completing Action** (indicate specific timelines (e.g. not 'ongoing') for action)
Strengthen & enhance semiconductors.	**Revise recruiting materials to reflect opportunities in the field.** **Review curriculum to ensure that it serves the current landscape.**	**Marketing Committee** **Undergraduate Curriculum Committee**	**2023-25 academic years** **2023-25 academic years**
Strengthen Nuclear programs- new faculty hires.	**Faculty renewal and growth is underway with 3 new hires.** **Review and revise nuclear curriculum in light of new teaching resources and current landscape.**	**Chair** **Undergraduate Curriculum Committee, new sub-committee on nuclear curriculum**	**2023-24 academic year** **2024-26 academic years**
Expanding role of Eng Phys in Level 1, possibly by creating an Eng Phys project in 1P13, adding TAs (or Instructional Assistant Interns) to 1P13, teaching in 1P13, teaching some sections of the first year physics courses.	**Explore opportunities for meaningful participation in 1P13 with Associate Dean's office.** **Explore opportunities for greater participation in Physics 1D03/1E03 curriculum and course delivery.**	**Chair, Undergraduate Associate Chair** **Chair, Undergraduate Associate Chair**	**2023-24 academic year** **This has been an 'ongoing' topic and likely will continue to be…**

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Strengthen relationships with student Engineering Physics Society. Consider having a student representative in the departmental meetings.	**Meet regularly with EngPhys Society Executive members and provide mentorship and support.** **Consider addition of a student representative to Undergraduate Curriculum Committee meetings.**	**Chair, Undergraduate Associate Chair, Department Administrator, Undergraduate Administrative Assistant** **Chair, Undergraduate Associate Chair**	**2023-24 academic year, and continuing, as needed** **2023-24 academic year**
There is a need to think creatively about a uniform way to deal with academic accommodation at the Departmental level, without imposing a crushing burden on already overloaded professors. Adopt universal design for courses where possible to reduce the extra work for instructors in managing students with accommodations.	**The Associate Dean's office is working on this as well. Coordinate distribution of best practices with them.** **Hold information session to advise instructors.**	**Chair, Undergraduate Associate Chair** **Undergraduate Associate Chair**	**2023-24 academic year** **2023-24 academic year**
Revisit the question of having an Advisory Committee at the Department Level.	**Consult with Department and key stakeholders to gauge support for participation on an Advisory Committee, to include an annual meeting.**	**Chair**	**2023-24 academic year**

Recommendation	Action(s) to be Taken	Responsibility for Leading Action (specify the role(s) that will be responsible for each action item e.g. Program Chair.)	Timeline for Completing Action (indicate specific timelines (e.g. not 'ongoing') for action)
Improve communication between the Departmental Office and other offices on campus. In particular, the other offices should consult and discuss proposed changes to processes before downloading more tasks on the administrative staff.	**University jurisdiction**	**N/A**	**N/A**
Keep an eye on the supplemental application process in order to document its success and any potential issues.	**Faculty jurisdiction**	**N/A**	**N/A**

Quality Assurance Committee Recommendation:

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation at the April 2024, meeting. The committee recommends that the **Engineering Physics** program should follow the regular course of action with an 18-month progress report and subsequent full external cyclical review to be conducted no later than eight years after the start of the last review.