

FINAL ASSESSMENT REPORT
Institutional Quality Assurance Program (IQAP) Review

Engineering Physics

Date of Review: November 26 – 27, 2013

*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 graduate programs delivered by the **Engineering Physics**. 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 Department of Engineering Physics submitted a self-study in October 2013 to the School of Graduate Studies to initiate the cyclical program review of its Diploma, M.Eng, M.A.Sc. and Ph.D. programs. The approved self-study presented program descriptions, learning outcomes, and analyses of data provided by the Office of Institutional Research and Analysis. Appendices to the self-study included a summary of the Ph.D. exit survey, the results of a confidential online survey circulated to all graduate students and the CVs for each full-time member in the Department.

Two arm's-length external reviewers from Saskatchewan and Quebec and one arm's length internal reviewer examined the materials and completed a site visit November 26 – 27, 2013. The visit included interviews with the Provost and Vice-President (Academic); Dean of the Faculty of Engineering; Dean of School of Graduate Studies; Chair of the Department of Engineering Physics, and meetings with groups of current students, full-time and part-time faculty and support staff. The review team also had the opportunity to tour the lab and facilities.

The Review Team wrote that Engineering Physics Department of McMaster is a good mix of well-accomplished senior faculty of high repute and ambitious young faculty. The department has adapted its major research directions to the evolving needs of society and changes in the industry landscape by updating and enhancing its research facilities with multi-million dollar grants from CFI, NSERC and other sources for material synthesis and characterizations as well as targeted, dynamic hires. This bodes well for the future of the diversity and high quality of the graduate programs at both Masters and Ph.D. levels, which currently achieve the goals of providing a high quality, timely education. The faculty and staff have very good working relationships and the atmosphere in the department is very collegial and of mutual respect. The review team noted that graduate students raised several important issues for consideration and provided a number of suggestions and recommendations for consideration, particularly where graduate student experience is concerned.

The Chair of the Department of Engineering Physics and the Dean of the Faculty of Engineering submitted responses to the Reviewer's Report (February/March 2013). Specific recommendations were discussed and clarifications/corrections were presented. Follow-up actions were included. McMaster's Quality Assurance Committee (QAC) reviewed the documentation associated with the review and determined that the external reviewer's report as well as the program response was positive and that no further action was required until the program comes up for review during the regular cycle.

- **Strengths**

- Major Research Directions
- Composition of Faculty
- Quality of Supervision

- **Weaknesses**

- Space
- Available Courses
- Graduate Student Financial Support

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

Recommendations

1. Space

The department should take steps to resolve the issue of graduate student spaces as it is currently inadequate and spread over a few buildings, leading many students to work from home and, in turn, having a negative effect of distancing them from their peers and department.

Department Response: To aid in addressing this issue, the department is first gathering more detailed information by surveying the graduate students on their opinions of the existing office space, how it is used, and what they consider important in terms of the quality of space. This information will be used to form a strategy for dealing with the space deficit. The department is considering a conversion of its existing student office space in the ETB building into a shared facility where some students might share desks in a common area.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

2. Graduate Student Financial Support

The top priority, also identified by the department, is to review the minimum stipend for domestic and Visa students. This is a major concern for many students, a possible important reason for the 15% drop out rate and a challenge when attracting the best students who have many options of excellent, competing similar programs in Ontario.

Department Response:

The department has done a comparison of graduate student pay among all engineering departments, including the supervisor paid portion (Table 2). Visa salaries are higher in order to compensate the higher tuition for these students. We believe the department's rates are comparable to most other departments. Nevertheless, the department is currently reviewing these rates and considering an increase in the student pay, and possible relief of the supervisor paid portion for scholarship recipients.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

3. TA Assignments

The department might consider allowing students some input to the courses they will TA. Generally, some graduate students expressed the wish to have access to more training in how to be a TA – teaching, pedagogy etc.

Department Response:

The Engineering Faculty is responsible for allocating the number of TA positions available to each department. The current TA allocation to Engineering Physics is insufficient to provide every graduate student with a full TA (130 hrs per term). The department has responded to this situation by mandatory supervisor-paid TA buyouts in the final term of every graduate student, in addition to a half TA clawback from those students who are awarded scholarships (NSERC, OGS, etc). In addition, domestic students are typically allocated 260 TA hours per year (130 hours per term), while Visa students are typically only allocated 130 hours per year. This inequity in TA assignments is partly responsible for the dissatisfaction among graduate students.

To address this issue, the department is considering revising its TA allocation by assigning all graduate students a single TA (130 hrs each) regardless of status. The department will hire undergraduate students into TA positions to provide some additional support for its programs.

The department has formalized the allocation of TA positions by issuing a form to course instructors in July, prior to the start of the academic term. The form is used by instructors to specify the number of TA positions required and any special skill sets required. Graduate students also receive a form in June where they can request their desired courses for the TA in order of preference.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

4. Two-part Comprehensive Exam

For students passing directly from a Masters to a PhD [the part 2 comprehensive exam] can, however, lead to some frustration, as they will spend 2 terms essentially preparing for the Master Thesis and then the comprehensive exam. As a consequence some graduate students feel that they spend too much time preparing for exams instead of doing research ... The 2nd part of the Comprehensive thus seems redundant to many graduate students; they question the value and purpose of 2nd exam. Several students pointed out that they essentially spend many months learning for the prelim, preparing for the 2nd Comprehensive and then a few months later for a supervisory meeting. This cuts into research time and thus time to completion.

Department Response:

The department has performed a comparison of comprehensive exam policies among the engineering departments as well as the Physics and Astronomy Department. Chemical, Mechanical, Electrical, and Physics and Astronomy have a requirement for a single comprehensive exam, while Civil, Computing and Software, Materials, and Engineering Physics have two comprehensive exams.

In Engineering Physics, Part 1 of the comprehensive exam tests the student's undergraduate knowledge, while part 2 tests the student's background knowledge for his/her specific thesis. Thus, the two exams serve a very different and important function. To clarify the role of these exams, the department will provide an information session at the beginning of each academic term to inform students of the exam purpose, format of the exam, and provide a Q&A.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

5. Graduate Course Offerings

The department should be encouraged to expand on collaborative teaching with the physics and astrophysics department to other departments on campus and elsewhere as well as investigate new developments in teaching. The ongoing initiatives for collaborative graduate level programming, allowing the pooling of resources with the department of Physics and Astronomy are highly encouraged. Finally, courses being offered by other departments that are suitable Engineering Physics graduate courses should be listed to give students a clearer message of what is available.

Department Response:

The department is exploring methods of becoming more efficient in its undergraduate teaching, to free more resources for graduate course offerings. The reviewers' suggestion to explore cross listing of Engineering Physics and Physics courses is already being examined by the department. The department already lists course offerings from other departments in the graduate calendar; however, these courses were not listed in the department website. This oversight has been corrected.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

6. M.Eng Program

After careful analysis the department is considering canceling this program, although it may be worthwhile to figure out if alternate modes of deliveries or different program requirements would make it more attractive for potential candidate. The department may want to reflect how to position and modify this program and investigate potential market needs not covered by other similar programs in the region before deleting this program.

Department Response:

The department is discussing how it might re-align the M.Eng. program to be more attractive to both students and faculty. We believe a course-based Master's option (in place of the current project-based M.Eng.) might be more attractive to students and would alleviate the challenges in finding suitable industrial projects. Feedback from graduate students on this issue will be sought.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

7. Nuclear Technology Diploma

The University should support the morphing of the current Nuclear Technology Diploma to a program delivered by UNENE. Delivering this program off-site will allow many more students to take these courses; they would still receive a McMaster degree.

Department Response:

The department has been working with UNENE and University administration to transfer ownership of the Nuclear Technology Diploma from Engineering Physics to UNENE. We expect to have this completed by January, 2015.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

8. Student Engagement

The students do not seem to feel that they belong to the department, nor that they have a voice in the

way things are run in the department. The creation of a specific Engineering Physics Graduate Student Association would build cohesion among the graduate students.

Department Response:

The department has formed a Graduate Student Advisory Council with a current membership of ~10 graduate students (we expect membership to grow over time). The Council is already planning a department colloquium, a summer workshop, as well as providing input into department administration, including all of the issues raised in this report.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

9. Time-to-completion

Reviewers' Comments:

The students are expected to complete their degree in 6 terms (2 years), after which they lose their office and funding but for the supervisor's RA support. Given these realities the department might want to consider if this policy is optimal from a student, humane and (both student and university) fiscal point of view.

Department Response:

Most of the delays in the time-to-completion are associated with procrastination in the thesis writing. In response to this problem, the department is planning an annual thesis writing workshop to provide advice to graduate students on the planning and writing of a thesis. The course will be offered in April/May of each year, with a first offering in 2014, at the time when students should be preparing to write their thesis. The department will continue to monitor the time-to-completion to assess the effectiveness of this approach.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

10. Graduate Student Recruitment

It was noted that the department does not seem to have a coherent graduate student recruitment Strategy. It is surprising that the direct entry option to the Ph.D. program is not being used often for the best students.

Department Response:

Although the normal route to the Ph.D. is through completion or transfer from the Master's program, the department does not have any formal policy forbidding entry to the Ph.D. directly from the Bachelor's. To improve recruitment into the Ph.D. and other programs, the department will form a recruitment committee with faculty and graduate student representation. As part of its recruitment activities, the department will make a greater effort to invite graduate program applicants to visit the department in order to attract these applicants to McMaster.

Responsibility for Leading Follow Up: Department/Department Chair

Timeline for Addressing Recommendation: Update at 18-month follow-up report

Dean's Response to Reviewers Recommendations and Program Response:

The Dean noted that the issue of graduate sitting space is a concern for several departments in the Faculty and will take time and resources to solve. The department's benchmarking reveals that the financial support for graduate students is commensurate with the rest of the Faculty. The Dean noted that overall the department's response to the issues raised was constructive and practical and that he was pleased that the department has been proactive and initiated strategies for improvements in several cases.

Quality Assurance Committee Recommendation

McMaster's Quality Assurance Committee (QAC) reviewed the documentation associated with the review and determined the program be allowed to continue on the normal review cycle and that a follow up report will be due in 18 months.