FINAL ASSESSMENT REPORT
Institutional Quality Assurance Program (IQAP) Review

Electrical and Computer Engineering

Date of Review: March 12 and 13, 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 **Department of Electrical and Computer Engineering**. *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.

Summary of the Cyclical Program Review of the Department of Electrical and Computer Engineering
The Department of Electrical and Computer Engineering submitted a self-study for their graduate programs to School of Graduate Studies (SGS) February 2013. The self-study presented the program descriptions and learning outcomes, an analytical assessment of these graduate programs offered by the department, along with the standard data package prepared by the Office of Institutional Research and Analysis. Appended were the course outlines for all courses in the program and the CVs for each full-time faculty member in the Department.

Two arm's- length external reviewers from Nova Scotia and Manitoba as well as one internal reviewer examined the materials and completed a site visit in March 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.

In their report the review team found the graduate programs in the Department of Electrical and Computer Engineering, leading to the MEng, MASc, and PhD degrees, to be generally strong as compared to similar programs across Canada. They seem to be well structured and well run. The department has about 32 full-time faculty members whose teaching and research are directly related to the graduate program under review. Many of the faculty members are nationally and internationally recognized for their research work and have been awarded research chairs as well as fellowships of leading professional societies.

The Chair of the Department of Electrical and Computer Engineering and the Dean of the Faculty of Engineering submitted responses to the Reviewer's Report (October 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 the program be allowed to continue on the normal review cycle and that at the 18 month report particular attention should be paid to the health of the M.Eng. program.

- **Strengths**
  - Graduate Student Morale
  - Research Output
  - Quality of Professors
- **Weaknesses**
  - Relationships with Industry
  - IT support
  - Common space for Graduate Students

Summary of the Reviewers' Recommendations with the Department's and Dean's Responses
Recommendations
1.   Hiring Priorities
The department should focus on research areas of strength, rather than attempting to be comprehensive.
Department response: At the behest of the new Dean of Engineering, the Department is
embarking on a refinement of its recent self-assessments. Based on current discussions, it appears likely that the Department will specify four areas in which it would seek to expand its faculty complement over the next five years.
Responsibility for Leading Follow Up: Department/Department Chair
Timeline for Addressing Recommendation: Update at 18 month follow-up report

2.   CREATE
The department should consider the development of resources for offering unique educational programs in their research areas of strength. NSERC's CREATE program is one potential source of such resources.
Department response: The Department concurs with the reviewers' suggestion and identified the development of group research proposal as a shared responsibility.
Responsibility for Leading Follow Up: Department/Department Chair
Timeline for Addressing Recommendation: Update at 18-month follow-up report

3.   Industrial Interaction

The department would benefit from greater industrial interaction on behalf of both faculty members and graduate students.
Department Response: The Department concurs with this suggestion and believes with the combination of input from the external advisory board (to be developed at the request of the dean), the further development of internship opportunities, and direct collaboration with industry significantly enrich the graduate programs, provide broader career options to their graduands, and enhance the stature of the Department. They are activities that they plan to enhance over the next five years.
Dean's Response: In alignment with the reviewers' comments about increased industry involvement, the Dean has requested that all Departments in the Faculty have in place an external advisory board by the end of 2013. One of the intended effects of this board would be greater awareness and greater interactions with local and broader industry.

Responsibility for Leading Follow Up: Department/Department Chair

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

4. Colloquium

The department should consider hosting a regular colloquium or specialized seminar series. Students have indicated that seminars and presentations by industrial partners on topics such as "life after Ph.D." would be very beneficial and helpful for most of the students who would pursue careers in industry.

Department response: The Department is well aware that insightful talks from distinguished researchers have the potential to enrich the intellectual life of the Department as a whole, and that it has been quite an oversight for us not to have such a formal seminar series. This is something that the Department has been beginning to address, in a somewhat ad-hoc way, by trying to increase the number of Distinguished Lecturers from IEEE Societies that it brings to McMaster. The Department also sees value in seminars by research collaborators in industry, and in seminars in the "general interest" and "life after Ph.D." style. In particular, they view the significant number of adjunct professors in the Department as being a group who would be in a good position to offer lectures in these styles. Emeritus Professors are another group.

Dean's response: As noted, the development of Colloquium series with both industry and distinguished academic speakers has already enriched the graduate student experience in the Department.

Responsibility for Leading Follow Up: Department/Department Chair

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

5. Modest number of technical staff and shared resources

Due to the small number of staff there can be delays with respect to resolving IT issues at peak times. The department should also develop strategies for sharing equipment and software between research groups.

Department response: The Department has recently added a student to its IT area on a part-time basis. It is hoped that the student will be able to assist with some smaller scale tasks and by doing so, free up time for some of their full-time staff to tackle larger issues. One of these larger issues was identified in the report: the development of a strategy to fund the upgrading of the Department's computational cluster.

With respect to equipment sharing, the Department notes that in the past, equipment and software has been shared between research groups on an ad-hoc basis, without a formal framework being established by the department leadership. Upon reflection, they think that one reason why this point arose might have been the fact that graduate students and their supervisors are not always aware of the equipment and software that is available to share. One step that the Department could take to rectify this would be to create a database of equipment and software that faculty members are willing to share, or rent, and to make this database available to grad students. That way, students and their supervisors can initiate informal sharing arrangements without the need for departmental intervention.

Responsibility for Leading Follow Up: Department/Department Chair

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

6. Common Space

The reviewers noted that graduate students would like to have a common space for social gathering.

Department Response: The Department sees great value in having a common space, and would like to be able to provide it. They note the difficulties of finding an appropriate space but have reserved one of the seminar rooms, ITB A311, for two hours in the middle of the day so that it can serve as the

Department's lunchroom. They will work with the students in their programs to evaluate the suitability of this room, and will adjust plans accordingly. To further foster relationships between graduate students who work in different areas, between students who grew up in different cultures, and between graduate students and the Department as a whole, the Department is exploring whether our graduate students would be interested in forming a club with a leadership group that would help to organize a variety of technical and social events.

Dean's Response: The need for communal space both within the Department and in the Faculty as a whole has been raised by the graduate students in other discussions, and the Dean is currently working with the Associate Dean (Graduate Studies) to overcome this problem.

Responsibility for Leading Follow Up: Department/Department Chair/Faculty Dean

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

7.   Courses

The reviewers noted that graduate students would like to be consulted on the graduate courses to be offered.

Department Response: While the range of courses that can be taught is largely dependent on the interests and expertise of the professors, the Department would be happy to entertain suggestions from the student body or from individual students.

Responsibility for Leading Follow Up: Department/Department Chair

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

8.   Poster Days

The students indicated that the "Poster Days" were not considered sufficiently seriously by faculty, and therefore by the students themselves.

Department Response: The Department is well aware that our Poster Day events are not achieving their goals of developing our students' communication and presentation skills. Furthermore, these events are not stimulating the exchange of ideas between students to the extent that they had hoped. Inviting some of our adjunct members to our graduate student Poster Days, and perhaps having them judge the quality of the presentations (even if the material being presented is beyond their area of expertise) might help to invigorate our graduate Poster Days.

Responsibility for Leading Follow Up: Department/Department Chair

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

9.   Ph.D. Comprehensive Exam

The PhD comprehensive exam is very unique and innovative, involving an oral examination on a topic somewhat removed from a student's knowledge base, and giving a fixed period over which to prepare. There was however some confusion on the part of students on what would be required of them for the exam. It is a suggestion that the process undergo some fine tuning in terms of planning, scheduling, and making sure that students are well aware of what is required for them to pass.

Department Response: In response to the issues raised by the reviewers the Department has discussed options for modifying their procedures and process of communicating expectations to the students. A variety of proposals for modifying the procedures have been suggested. In the end, they decided that for now they would take the small step of providing the questions to the students three weeks before the exam rather than the previous two. They are also improving the way in which we communicate the

purpose of the exam to the students and the way in which they outline the expectations regarding the level of sophistication of the students' presentations and the responses to the questions that they are asked in the exam.

10.   M.Eng. Program

There have been recent surges in the domestic student enrollment in the MEng program. This has secured additional financial resources from the provincial government with a resulting benefit in the operations of the graduate programs as a whole; but, it has also caused some confusion amongst students and faculty regarding the objectives of the MEng program and some concern about the quality of the students enrolling in the MEng program. Articulating more clearly the role of this program would be helpful. As well, close monitoring is suggested to ensure that the increased enrollment does not negatively impact on the overall quality of the graduate programs.

Department Response: In several places in their report, the reviewers highlight contrasting opinions among faculty members, and even among students, regarding our M.Eng. program. These contrasts are not a surprise to the department leadership because the opinions were widely aired when the M.Eng. program was initially proposed. The contrasting opinions are not destructive in any way. They simply represent different perspectives on how the Department should best allocate its resources. Furthermore, when contrasting opinions have been stated, they have always been stated in a collegial manner.

One reason why the negative opinions of the M.Eng. program may have resurfaced is the uncertainty regarding the funding model. The incentives that encouraged the Department to invest its own resources in expanding the M.Eng. program are no longer in place. In the short term, the Department has negotiated some alternative incentives, but, by necessity, these were not as valuable to the Department as the initial incentives. The broad understanding of these issues has led to more informed debate, but in the absence of a stable funding model, support within the Department for the program is not universal.

Dean's Response: While enrollment remains high, the perception that the students in the program are less able intellectually than their counterparts and a lack of understanding on the part of faculty members of the relational for this program must be addressed. In particular, the financial health of the program, given changes in the funding model, have been an area of significant concern. The Faculty is in agreement with the view of the Department that these students enrich the program overall and that the MEng program plays a key role in the education of engineering graduates. The Faculty will continue to work with the Department to ensure that the health of the program is enhanced in the future and that a more stable funding structure can be developed.

Responsibility for Leading Follow Up: Department/Department Chair/Faculty Dean
Timeline for Addressing Recommendation: Update at 18-month follow-up report

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 at the 18 month report particular attention should be paid to the health of the M.Eng. program.