FINAL ASSESSMENT REPORT
Institutional Quality Assurance Program (IQAP) Review
Electrical, Computer, and Biomedical Engineering
Undergraduate Programs

Date of Review: March 31 – April 1, 2016

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 programs delivered by the ***Department of Electrical and Computer Engineering****. This report identifies the significant strengths of the programs, 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 Cyclical Program Review of the Undergraduate Electrical, Computer, and Biomedical Engineering Programs

In accordance with the Institutional Quality Assurance Process (IQAP), the Department of Electrical and Computer Engineering submitted a self-study in January 2016 to the Associate Vice-President, Faculty to initiate the cyclical program review of its undergraduate 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 contained all course outlines associated with the program and the CVs for each full-time member in the department.

Two arm's length external reviewers, one from Ontario and one from British Columbia and one internal reviewer were endorsed by the Dean, Faculty of Engineering, and selected by the Associate Vice-President, Faculty. The review team reviewed the self-study documentation and then conducted a site visit to McMaster University on March 31 – April 1, 2016. The visit included interviews with the Provost and Vice-President (Academic); Associate Vice-President, Faculty, Chair of the department and meetings with groups of current undergraduate students, full-time faculty and support staff.

The Chair of the department and the Dean of the Faculty of Engineering submitted responses to the Reviewers' Report (January 2017). Specific recommendations were discussed and clarifications and corrections were presented. Follow-up actions and timelines were included.

The Final Assessment Report was prepared by the Quality Assurance Committee to be submitted to Undergraduate Council, and Senate (February 2017).

Strengths

In their report (April 2016), the Review Team highlighted the following strengths of the program:

- Innovation in teaching, including experimentation with flipped and online classrooms
- Large strong hands on/problem-based components including substantial course laboratories and a capstone design project
- Broadly inclusive system of governance that ensures continuous improvement
- Engaged student body that feels heard and respected
- Unique opportunities for multidisciplinary learning in Electrical & Biomedical Engineering

Areas for Improvement and/or Enhancement

The Review Team identified the following areas for improvement:

- Quality and efficient use of teaching assistant resources
- Large class sizes
- In the Electrical and Computer Engineering program [sic], ensure students are prepared for success in postgraduate education

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

Recommendations

Recommendation	Proposed Follow-Up	Responsibility for Leading Follow-Up	Timeline for Addressing Recommendation
Carefully monitor and track the relationship between new admission criteria (including video interviews) and students' academic success	As it is the Associate Dean (Academic) who oversees the assessment of supplementary material in the students' applications for entry into the first year of all engineering programs, the proposed follow-up will involve substantial collaboration with that office. The proposed follow-up strategy will operate at two time scales, which is chosen so that we will obtain prompt feedback on the	Chair and Associate Chair for Undergraduate Affairs, in association with the Associate Dean (Academic)	Seeing as the first cohort of students for whom the supplementary application material will come into play will enter first year in the Fall of 2017 and will graduate in the spring of 2021 at the earliest, this project has quite a long time line. However, if the monitoring is limited to success in the first year, that timeline can be brought forward substantially.

	role that the supplementary application will have on student success, is to assess the impact on the students' performance in first year. The Associate Dean's office will likely be doing that anyhow and will procedures in place. The process at the longer time scale is to assess the impact of the supplementary material on graduation rates from our programs. That would involve obtaining data from the Associate Dean's Office on groups of students who were selected based on the supplementary material and comparator groups who were selected in the conventional way, and tracking students in both groups as they progress through our programs, using information such as sessional averages, whether or not they take a co-op opportunity, the number of (active) terms to graduation, and how they were engaged in the student community. The last of these items could be based on learning portfolios that students might be willing to share, but would likely be easier to assess if an envisioned extra-curricular record is put		

Look for opportunities to improve TA quality by recognizing and incentivizing excellence, and by making appropriate use of senior undergrads to help deliver programs.	into place. The department is committed to creating a culture in which our TAs feel that their efforts to improve the educational experience of the students in our program will be recognized. We have made a budgetary allocation for several "outstanding TA" awards and we are currently working on a selection methodology that is driven by input from the students in our programs. We are also encouraging individual professors to find small ways to celebrate the contributions of their TAs to individual courses. We are also contributing to a Faculty-wide effort to improve the education that is provided to TAs when they arrive at McMaster, and at the beginning of each term. We are hopeful that these activities will help us raise the average contribution of our TAs, in addition to celebrating the contributions of our most engaged TAs. The expansion of our undergraduate program that will begin in September 2017 will likely mean that we will	Chair and Associate Chair for Undergraduate Affairs, in consultation with the Associate Chair for Graduate Affairs	April 2017

	need to hire undergraduate TAs in addition to our conventional practice of hiring graduate students as TAs. This will provide an opportunity for us to evaluate the impact of undergraduate TAs and to experiment with techniques for selecting and mentoring undergraduate TAs.		
Consider a more nuanced formula for the allocation of existing TA resources among courses.	In fact, our current approach to the allocation of TA recourses is already more nuanced than the perception that the reviewers have brought to our attention. Perhaps this perception is a legacy of the explanations that were provided in the past when requests for additional TAs were denied. As a first step towards adjusting the perception, there was an extended discussion at the departmental retreat in June 2016 on the way in which the Dean's Office assigns TA resources to the department, and the way that those resources are assigned to individual courses by the department. This discussion has substantially increased the awareness in the department of how TA resources are allocated to courses. The substantial variation in	Chair and Associate Chair for Undergraduate Affairs	June 2017

	the number of students per TA that was presented in that discussion has emphasized the roles that laboratories, open ended projects, and teaching and assessment methodologies play in the assignment of TA recourses. However, that variation has also alerted us that we ought to develop more sophisticated metrics to guide our judgement in this assignment process and to draw our attention to anomalies. One issue that will require some sophistication is the variable enrolment in elective courses. We are able to predict the enrolment in our compulsory courses with reasonable accuracy, but the enrolment in elective courses can vary quite a lot. Our plan is to use a two-year average of enrolments to filter this variation while remaining reasonably nimble. We will reassess that choice over time. A significant benefit of our discussion at the retreat is that the data that was presented has put us in a position where we have been able to have a		

	discussion with faculty members who appear to have spare TA capacity regarding how their TAs are used, and how they might be more effectively used in other courses. This has provided those instructors with time to adjust the way in which their courses are delivered prior to changes in the TA allocations.		
Look for ways to reduce maximum class sizes.	With the expansion in the number of students in 2017, we will have a number of second and third year courses with over 300 students in the class. Our plan is to section as many of these courses as possible to reduce the class size. Some of our courses are offered online or in a flipped-classroom model. This makes the size of the class less of an issue. Furthermore, since the writing of the report we have hired two new faculty members and are in the process of hiring a third. We expect a fourth to be in place by July 2017. For cases in which sectioning is still not possible, we are planning to hire "instructional assistants" to help instructors with the administrative load that arises when teaching	Chair and Associate Chair for Undergraduate Affairs	September 2017

	large classes. The help from the instructional assistant will free up the instructors time to create a better learning experience for students.		
Track students studying in the program of their 1st, 2nd, or 3rd choice, and correlate this with their later success in their program.	Clearly, we are only able to track those students that join one of the programs offered by our Department. W will coordinate with the Associate Dean's office to get the students' choice number. We will correlate this with their success (perhaps their GPA in second, third, fourth and fifth years) and graduation rate. As a recent development related to this point, in the cohort that entered our programs in the Fall of 2016 (at level 2), the "cut-off" grade-point average (on McMaster's 12-point scale) was well above the minimum of 4. This reduces the risk that students in our programs will be getting their third choice of program, but that will not diminish our efforts to track the progress of those students who do not get their first choice.	Chair and Associate Chair for Undergraduate Affairs, in consultation with the Associate Dean (Academic)	September 2017

Faculty Response:

As detailed in the Chair's response, the recommendations in the review have led to a series of discussions within the Department focused on the effective use, recognition, and allocation of TAs, the issue of large class sizes, better tracking of student success and trying to enhance student exposure to research versus the experience in the Biomedical program, and efforts to balance workloads for

students working on their capstone projects. Many of these initiatives have been addressed or are on-going.

Overall, the dean is satisfied with the replies of the department to the concerns raised by the IQAP reviewers.

Quality Assurance Committee Recommendation

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation and the committee recommends that the program should follow the regular course of action with an 18-month progress report and a subsequent full external cyclical review to be conducted no later than 8 years after the start of the last review.