

FINAL ASSESSMENT REPORT
Institutional Quality Assurance Program (IQAP) Review

Biomedical Engineering

Date of Review: April 1-2, 2015

*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 **Biomedical 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.

Executive Summary of the Review

The School of Biomedical Engineering submitted a self-study to the School of Graduate Studies in February 2014. The self-study presented the program descriptions and learning outcomes, an analytical assessment of these two programs, and program data including the data collected from a student survey along with the standard data package prepared by the Office of Institutional Research and Analysis. Appended were the CVs for each full-time faculty member in the Department.

Two external reviewers and one internal reviewer conducted a site visit April 2014. The visit included interviews with the Provost and Vice-President (Academic); Dean of the Faculty of Engineering; Dean of School of Graduate Studies; School of Biomedical Engineering leadership, 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 School of Biomedical Engineering (SBME) to be very good, noting no major programmatic issues and substantial enthusiasm in the program and from senior management.

Strengths:

- The School has excellent programs at both the Master's and PhD levels, which are universally recognized as "very good"
- There is a high level of enthusiasm for the programs

Weaknesses:

- The reviewers noted that the School lacks a strategic plan; this is being implemented
- There are a number of minor issues surrounding the courses offered in the program; these need to be addressed in toto, perhaps as part of the strategic plan
- Concerns were raised around the process of Director succession; careful planning is needed in this area

- Student financial support, especially for foreign students, is not in line with other institutions; this may impact program enrolment

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

Recommendations

1. Strategic Planning Exercise

Suggestion is made that the SBME undergo an exercise to develop a vision, mission and strategic plan in consultation with the Deans of Engineering and Health Sciences. Articulation and discussion of the SBME strategic plan is critical to ensure best alignment with University and Faculty plans. A SBME strategic research plan will also ensure that the school has the appropriate impact and visibility at McMaster University. As part of this strategic planning process, additional thought should be given to the four self-identified research themes. The SBME should affirm that these are the most appropriate areas for robust future development and allocation of resources.

Program Response: SBME is planning a one-day faculty retreat for early fall or late summer if schedules permit. At this time a strategic plan, vision and mission statement will be created for the school. The administrative leadership of the school will use a collaborative, team-based approach in developing these statements. The four current research areas will be reviewed at the faculty retreat and in conjunction with the Deans of Engineering and Health Sciences to confirm the future direction the school wants to pursue.

Responsibility for Leading Follow Up: Department/Department Chairs

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

2. Admissions

It is suggested that SBME review their admission procedures and define a distinctive SBME admission culture, which is clearly articulated on the program web site.

Program Response: The current SBME application process and requirements will be clearly outlined on the website. This will also include details on the review and notification process for students.

Responsibility for Leading Follow Up: Department/Department Chairs

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

3. Curriculum

1) Reduction in number of required courses for Ph.D. students

Program Response: Requests for the curriculum to be updated will be submitted to change the requirements for students who transfer from MASc to PhD to be reduced from 3 to 2 courses at the PhD level.

2) A more comprehensive suite of courses should be developed and the SBME should attempt to offer these elective courses on a predictable basis.

Program Response: A survey/questionnaire is being sent to all current students to obtain their input on what additional courses they would like to have permission to take. For those courses with high volume requests, submission will be made to The School of Graduate Studies and the departments offering

these courses to have them cross-listed as BME courses also. A review of historical course activity will also take place to determine what areas have high demand for additional courses to be added.

3) The requirement to broaden knowledge to include one course from engineering/health science per degree be modified so that it is only a requirement at the PhD level.

Program Response: We agree with this recommendation and will submit the appropriate requests to the Graduate Curriculum and Policy Council to adjust the program requirements.

4) The program should consider formally providing instruction on how to communicate effectively (perhaps as part of BME701 and BME706) or at the annual workshop.

Program Response: Effective communication will be part of the newly proposed Medical Science course ("Research Methodology in Medical Sciences") course specifically designed for Medical Science and BME students. It is also being requested that this be cross-listed as a BME course.

Responsibility for Leading Follow Up: Department/Department Chairs

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

4. Comprehensive Exam Procedure

It is suggested that the PhD comprehensive exam procedure be revised to having students prepare and defend a research proposal for their intended thesis research.

Program Response: The program feels that the recommended method (above) is too similar to our current PhD transfer exam already in place. Numerous graduate programs at McMaster University use the policy currently in place, where the PhD comprehensive exam is on a topic similar to, but not the same as students' thesis topic. This approach enables the student to continue to develop a more comprehensive understanding of relevant research areas.

Responsibility for Leading Follow Up: Department/Department Chairs

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

5. Administrative Support

The program should consider funding additional administrative personnel.

Program Response: This will be reviewed in the future depending on the direction the SBME takes.

Responsibility for Leading Follow Up: Department/Department Chairs

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

6. Academic Workload and Chairs

The academic workload within the program could be spread amongst all faculty members rather than a core group. Specifically this could ensure that more elective courses are offered on a regular basis (which would greatly benefit students). The program should also seek to develop and fill chair positions for new faculty in identified priority areas.

Program Response: This will be discussed in more detail at the faculty retreat. Hiring of new faculty and appointment of new research chair positions needs to be discussed with Deans and Departmental chairs. As this is already covered in the Engineering Strategic Plan, SBME Directors will work with all parties to move forward on this.

Responsibility for Leading Follow Up: Department/Department Chairs/Faculty Deans

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

7. Student Engagement and TA-ships

a) Strategies to attract more health and life science students to the SBME program should be developed and implemented.

Program Response: This will be discussed in more detail at the faculty retreat and with the Deans of both Faculties

Responsibility for Leading Follow Up: Department/Department Chairs/Faculty Deans

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

b) Biomedical Engineering should work with associated departments to identify a suite of courses in which TAships could be earmarked for SBME students.

Program Response: SBME works with the other departments but they cannot identify courses that will be specifically ear-marked for SBME students. As each department makes offers to their own graduate students that include a TAship, the allocation will go to covering their own commitments before they commit to another department. In previous years there was not a large issue in finding TA positions for all of our students. During the past year this has become more difficult due to the increase in graduate students in other areas. If this continues to be an issue in the current year, we will discuss with the Deans the possibility of not reducing the other area TA allocation if they take on an additional BME TA, therefore assisting us in placing all SBME students.

Responsibility for Leading Follow Up: Department/Department Chairs/Faculty Deans

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

8. Co-Director Model

It is strongly suggested that the program leadership will eventually be better served by having a single Director who can lead in both Engineering and Health Science, once the current co-Directors step down.

Program Response: This will be discussed further at the faculty retreat. There needs to be a strong linkage to both faculties and having a director from each area has allowed those linkages. Indeed, we believe this has strengthened engagement between the 2 faculties, relative to what was in place before the co-director model. To continue with this structure, the Terms of Reference will be updated and dispute resolution methods will be clearly outlined and agreed to by both faculties.

Responsibility for Leading Follow Up: Department/Department Chairs in consultation with Faculty Deans

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

9. Graduate Program Requirements

a) Only those faculty who have shown a reasonable commitment to the program, through active involvement in service, teaching and/or graduate supervision, should be retained.

Program Response: This was done as part of the IQAP review and the membership was reduced to include only those faculty who are actively teaching courses and/or supervising SBME students. The review will continue on an ongoing basis for faculty requesting membership within the School.

Responsibility for Leading Follow Up: Department/Department Chairs

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

b) It is planned that SBME students will be able to take a statistics course offered by Medical Sciences. While this will provide statistics training, it may not be well oriented to Biomedical Engineering needs. It is suggested that SBME develop and offer its own course on statistical analysis for Biomedical Engineers. Until this course is ready, students can take the proposed course in Medical Sciences.

Program Response: This course ("Research Methodology in Medical Sciences") will be requested to be crosslisted as a SBME course. The course may also be provided partially by an SBME member, which will ensure that the curriculum covers the Biomedical engineering needs. This will be reviewed once the course has been run a couple of times to determine if a further course specific to BME is required.

Responsibility for Leading Follow Up: Department/Department Chairs

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

10. System of Governance

a) A significant portion of the day-to-day operations should be devolved to the Administrative Manager (provided this becomes a full time position per the earlier recommendation). This will allow the academic leadership more time for strategic activities. The impression is that the current Co-Directors are actively engaged in too much of "the administrative and supervisory workload."

Program Response: The Co-Directors are not overly engaged in the administrative workload. The Co-Directors do have a larger supervisory role (of graduate students in the program) than some other members of BME. However, this is due to their active research programs. The remaining issues raised will be part of strategic plan and succession plan is also required for the current leadership. One of the co-directors has continued to take on more teaching responsibilities for the program. At the faculty retreat we will discuss more even distribution of course load.

Responsibility for Leading Follow Up: Department/Department Chairs

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

b) The SBME should consider developing an Executive Committee that would meet 6 to 12 times a year and provide guidance and support to the school's leadership.

Program Response: The program agrees with this recommendation but feel that currently due to the size of the program it is not necessary to meet 6-12 times per year. We feel that once or twice per year should be adequate. An SBME Executive committee will officially be set up and we will also request one member from BMEGA to sit on this committee and participate in the management of SBME.

Responsibility for Leading Follow Up: Department/Department Chairs

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

c) Research trainees (both graduate students and fellows) should be asked to play an active role in school governance, as deemed appropriate. The BMEGA should be asked to provide a representative to sit on the proposed SBME Executive Committee.

Program Response: Graduate students have been asked to play a partial role in school governance. Going forward, BMEGA will be asked to provide one member who will sit on departmental committees

and attend the SBME faculty meetings. SBME students have also played an active role in the past few years on University Committees and this has typically been BMEGA members, including Faculty GSPC and University Senate.

Deans' Response to Reviewers Recommendations and Program Response:

The reviewers commend the program, highlight a concern regarding succession of the current directors, and provide a vision of an autonomous, prestige school to consider for the future. Both faculties are aware of the importance of succession planning for graduate program leadership. Both faculties support increased international recognition of the school and its faculty. The faculties will support the program's efforts to improve the school's outreach into the Faculty of Health Sciences as part of the efforts to achieve international excellence through strongly inter-linked biomedical research.

The Deans reviewed the detailed response provided by the co-Directors of the school and found their plans to improve the quality of the program satisfactory and practical. Some points made by the reviewers related to post-doctoral fellows were outside the scope of a graduate program review, in the view of the Deans. They look forward to the outcome of the School's faculty retreat this fall where it is hoped many of the 'future looking' recommendations will be discussed with development of a strategic plan for the program's evolution. The Deans agree that it is timely to re-evaluate the areas of research strength in the program. The program has appropriate plans for implementing the changes suggested to course work. They agree with the views of the program faculty, that the comprehensive examination changes that were suggested by the reviewers are not in keeping with McMaster University policies where the examination needs to have a focus that is distinct from the thesis work that is assessed at committee meetings. They feel that the program's responses to suggestions on resources and other issues were also thoughtful and appropriate. The current model of having co-Directors is working well at present, but the deans would not exclude the possibility of appointing a Director and an Associate Director in the future, should it become the preferred arrangement.

Quality Assurance Committee Recommendations

The Committee finds that the programs are of very high quality, and that the review raises a number of important but not critical points that could be addressed to improve the programs. Subject to satisfactory progress in addressing these issues being demonstrated in the 18-month follow-up report, the Committee recommends that the program proceed to the next review at the normal time, i.e. at 8 years after the present review.