

UTQAP Cyclical Review: Final Assessment Report and Implementation Plan

1. Review Summary

Programs Reviewed:	Biomedical Engineering, MASC, MEng, PhD Clinical Engineering, MHSc
Unit Reviewed:	Institute of Biomedical Engineering
Commissioning Officer:	Dean, Faculty of Applied Science and Engineering
Reviewers (Name, Affiliation):	<ul style="list-style-type: none">• Dr. Gang Bao, Foyt Family Professor and Chair, Bioengineering and Professor, Chemistry and Materials Science & Nanoengineering, George R. Brown School of Engineering, Rice University• Dr. David Juncker, Professor and Chair, Biomedical Engineering, Biological and Biomedical Engineering Program, Faculty of Medicine and Health Sciences, McGill University
Date of Review Visit:	May 18-25, 2021 (conducted remotely)
Date Reported to AP&P:	February 16, 2023

Previous UTQAP Review

Date: November 19-20, 2012

Summary of Findings and Recommendations

1. Graduate Programs

The reviewers observed the following **strengths**:

- The quality of the doctoral programs, reflected in the large number of first-authored student publications and presentations at international meetings
- Strong clinical engineering training offered to students

The reviewers made the following **recommendations**:

- Defining critical knowledge and ensuring an appropriate curriculum is in place for each of the research areas, including relevant training in ethics
- Finding ways to bring students together to support career and professional development, including exposing them to international biomedical engineering research

2. Faculty/Research

The reviewers observed the following **strengths**:

- Excellent, internationally-recognized faculty, engaged in pioneering research

3. Administration

The reviewers observed the following **strengths**:

- The unique simulation laboratory facilities
- Excellent partnerships with associated Faculties, hospital partners, translational organizations and local industry

The reviewers made the following **recommendations**:

- Increasing staff support for the collaborative program to ensure students have access to appropriate advising
- Further developing strategies to market the programs and recruit international students, including clearly identifying available degree programs
- Addressing the challenges that space restrictions pose, in the short and long terms

Current Review: Documentation and Consultation

Documentation Provided to Reviewers

Terms of reference; self-study; previous review report including the administrative response; access to all course descriptions; access to the curricula vitae of faculty; PPTs of Faculty and IBME overviews; FASE Academic Plan, 2017-2022; FASE Annual Impact Report, 2020-2021.

Consultation Process

The review team met with the FASE Dean and academic leadership team; Deans of partner Faculties (Medicine and Dentistry); IBME Director and academic leadership team; IBME core faculty, graduate students, administrative staff and senior program administrators, as well as heads of relevant cognate units within FASE and the Temerty Faculty of Medicine.

Current Review: Findings and Recommendations

1. Graduate Program

Unless otherwise noted, all bulleted comments apply to all programs reviewed.

The reviewers observed the following **strengths**:

- Overall quality
 - ▶ Overall, reviewers remarked on the excellence of IBME's graduate programs
- Admissions requirements
 - ▶ IBME's graduate programs admit top students and engage in strong outreach
- Curriculum and program delivery
 - ▶ Reviewers noted the consistent growth of the PhD, MASc and MEng programs in recent years, though a decrease in the MHSc
- Student engagement, experience and program support services
 - ▶ IBME has a developed student community environment, supporting students through student conferences and townhalls
 - ▶ Institute receives positive feedback from students overall and is seen as having supportive faculty and staff
- Quality indicators – graduate students
 - ▶ Students successful at finding positions in a wide range of industries, though reviewers noted data after graduation is unclear

The reviewers identified the following **areas of concern**:

- Student funding
 - ▶ Current website information on awards "is confusing to navigate, and deadlines are not updated in timely manner."

The reviewers made the following **recommendations**:

- Curriculum and program delivery
 - ▶ Improve monitoring of student progress to ensure deadlines are met, such as through a digital tracking system
 - ▶ Better implement rules regarding student advising and supervision. Consider adopting letters of mutual understanding between supervisors and students that can be edited by both parties to help manage mutual expectations
 - ▶ Reviewers encourage increasing elective offerings, and making some classes more challenging.
- Student engagement, experience and program support services
 - ▶ Increase availability and better inform students of counselling resources, specifically regarding conflict resolution and providing contact information of mediators
- Quality indicators – alumni
 - ▶ Track student employment and field upon program completion to gain a better sense of percentage of placements amongst job seekers
- Student funding
 - ▶ Increase student stipends to reflect the high price of Toronto housing and inflation
 - ▶ Improve clarity regarding internal awards

2. Faculty/Research

The reviewers observed the following **strengths**:

- Overall quality
 - ▶ Reviewers highlighted the excellence of IBME faculty, which has been recognized by numerous international and national awards
 - ▶ “The new initiatives and an entrepreneurial director, strong vision and operational savviness have led to a remarkable transformation of the institute over the last few years”
- Research
 - ▶ “BME-centric research initiatives underpin major successes of the U of T, such as the Medicine by Design supported by the Canada First Research Excellence Fund (CFREF) and the Ted Rogers Centre for Heart Research”
 - ▶ The institute has strong research activity overall that aims to rival leading international departments
 - ▶ Benefits from strong ties with researchers within the Faculty of Applied Science & Engineering, as well as the Temerty Faculty of Medicine and the Faculty of Dentistry
 - ▶ The institute has an outstanding publication record, “consistently publishing approximately 200 publications a year, many in top journals including Science, Nature, and Nature sub-journals”
 - ▶ Grant applications are well supported, including the editorial review of proposals
- Faculty
 - ▶ “There are a large number of outstanding faculty with strong funding and national and international leadership”

- ▶ Reviewers commented that there is a good balance of ranks within the budgetary core faculty, and that this core faculty is complemented by a large number of cross-appointed faculty who are strongly attached to the institute

The reviewers made the following **recommendations**:

- Research
 - ▶ Address the drop in IP applications as a result of institutional IP application challenges.
- Faculty
 - ▶ Provide supports to faculty teaching large classes, such as TAs
 - ▶ Clarify tenure track procedures and provide equitable awards for teaching stream faculty
 - ▶ Offer feedback and additional guidance for pre-tenure faculty members on tenure progress, and on whether to apply for promotion during annual review
 - ▶ Provide more guidance for post-tenure faculty members as to what is needed for the ‘next step’ of tenure through the annual review process
 - ▶ Formalize a faculty mentorship program to better support junior faculty

3. Administration

The reviewers observed the following **strengths**:

- Relationships
 - ▶ Reviewers remarked on the excellent working relationship between the Faculty of Applied Science & Engineering, the Temerty Faculty of Medicine, and the Faculty of Dentistry, “forming a foundation for future success”
 - ▶ The institute managed to maintain morale during COVID-19.
 - ▶ There are ongoing partnerships with local units on student recruitment
 - ▶ An excellent outreach program via social media and IBME’s two websites, though website structures could be improved
 - ▶ Outreach activities appear in line with other Canadian universities
- Organizational and financial structure
 - ▶ “IBME draws on a long and rich history within U of T, and has grown rapidly in this millennium while emerging as one of the crown jewels of the U of T.”
 - ▶ The institute has rapidly transformed and evolved with the field, with strong support from faculty for recent changes that have been made
 - ▶ “IBME has successfully risen on a wave of rapid growth of BME (biomedical engineering) and bioengineering in North America (and globally) over the last 25 years.”
 - ▶ “IBME has established a well-oiled governance structure for operations within the [Faculty of Applied Science & Engineering] with activity-based budgeting, while receiving support from the Faculty of Medicine and Faculty of Dentistry.”

- Long-range planning and overall assessment
 - ▶ Following a change of leadership, the management of IBME underwent a reorganization and streamlining, “which has further cemented its success and reputation by increasing the number of student applications, recruiting new faculty, and freeing up budget for renovations.”
 - ▶ Reviewers commented on the excellent use of resources and the streamlining of processes that has helped to free funds to support space renovations

The reviewers identified the following **areas of concern**:

- Relationships
 - ▶ “A challenge of IBME is that it serves as a hub and its success is both dependent on, and amplified by, multilateral collaborations with many parties across different faculties”
- Organizational and financial structure
 - ▶ The growth of IBME requires more space for laboratories and offices; lacks state-of-the-art infrastructure

The reviewers made the following **recommendations**:

- Relationships
 - ▶ Reviewers recommend developing a communication and partnership strategy on how to efficiently communicate and liaise with departments within the Faculty of Applied Science & Engineering as well as with departments in the Faculties of Medicine and Dentistry. The themes could include recruitment, faculty performance evaluations and tenure process and criteria, undergraduate and graduate student recruitment, teaching and evaluation, research, and strategic initiatives
 - ▶ Strengthen communications with faculty regarding plans and decisions being made by IBME leadership
 - ▶ Consider holding monthly institute meetings to discuss plans and obtain feedback
 - ▶ Provide graduate students with a list of IBME staff and their administrative responsibilities
- Organizational and financial structure
 - ▶ Expand graduate programs and create an undergraduate program to generate new revenue
 - ▶ Improve the size and quality of administrative space.
 - ▶ Consider resuming the position of Associate Director of Research, with the position’s role clearly defined
- Long-range planning and overall assessment
 - ▶ Develop a faculty complement plan to increase the number of core faculty over the next five years by continuing strong faculty recruitment with participation from the Faculties of Medicine and Dentistry
 - ▶ Emphasize diversity in future faculty recruitment

- ▶ Reviewers strongly recommend establishing an undergraduate BME program, to appeal to students with interests in biological applications, that would complement existing undergraduate programs within the Faculty of Applied Science & Engineering
- ▶ Creating an undergraduate program would give the University “the opportunity to become a leader in both graduate and [undergraduate] BME education, as many universities in Canada (UBC, McGill, Waterloo, etc.) offer UG BME or Bioengineering programs.”
- ▶ Reviewers encouraged investments in space and facilities including the expansion of research space, refurbishing existing IBME space, and having more IBME office space to help build greater culture and collaboration within the institute
- ▶ Forge stronger ties with University Advancement
- International comparators
 - ▶ “Spearhead the expansion and transformation of BME in Canada, along with peer institutions such as UBC, McGill and others”
 - ▶ “Be attuned to the developments of BME in North America and globally, and orient IBME with leading programs, such as those at Georgia Tech, Johns Hopkins, Rice, École Polytechnique fédérale de Lausanne, etc”



2. Administrative Response & Implementation Plan

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

January 27, 2023

Professor Susan McCahan
Vice-Provost, Academic Programs
University of Toronto
27 King's College Circle

Dear Professor McCahan,

I write in response to your letter of July 19, 2022 regarding the May 2021 external review of the Institute of Biomedical Engineering (BME) and its programs.

The external review process is a valuable exercise that affords us the opportunity to take stock of the state of our academic units and of the Faculty as a whole. We are extremely pleased with the reviewers' positive assessment of the overall strength and growth of the institute and its programs, its growth and continued evolution in the field, and its outstanding, productive core faculty and cross-appointed faculty.

The quality of this program notwithstanding, the review report raises a number of issues and challenges. These have been addressed in the attached table, which was developed in consultation with the director of the Institute of Biomedical Engineering. For most of the areas, an implementation plan has been provided that identifies actions to be accomplished in the short (six months), medium (one to two years) and longer (three to five years) terms, and who (Institute, Dean) will take the lead in each area. I have also identified any necessary changes in organization, policy or governance where appropriate; any resources, financial and otherwise, that will be provided, and who will provide them.

The next steps for some of the recommendations are still being discussed with the Institute, and I request the opportunity to provide a one-year follow up report with an updated implementation plan addressing these areas.

My office provided comments on the review summary component of the draft *Final Assessment Report and Implementation Plan* on January 19, 2023.

I anticipate the next review of the Institute of Biomedical Engineering will be in 2027-2028 to coincide with end of the director's term. Chairs and directors in FASE are expected to report on progress made toward their external review goals at least annually at a meeting of the chairs and directors, which I chair.

I acknowledge that you will request a brief report midway between the 2020-2021 review and the year of the next site visit.

I also confirm that I will attend the February 16, 2023 meeting of the Committee on Academic Policy & Programs to answer any questions that may arise.

Thank you very much for the opportunity to respond to the report of the external review team. Their comments and recommendations will help inform the vision and future priorities for the Institute of Biomedical Engineering.

Sincerely,



Chris Yip
Dean

cc:

Warren Chan, Director, Institute of Biomedical Engineering, Faculty of Applied Science & Engineering

Craig Steeves, Acting Vice-Dean, Graduate Studies, Faculty of Applied Science & Engineering

Tom Coyle, Vice-Dean, Undergraduate, Faculty of Applied Science & Engineering

Caroline Ziegler, Faculty Governance and Programs Officer, Faculty of Applied Science & Engineering

Daniella Mallinick, Director, Academic Programs, Planning and Quality Assurance

David Lock, Coordinator, Academic Planning and Reviews

Emma del Junco, Acting Coordinator, Academic Planning and Reviews

Alexandra Varela, Assistant Coordinator, Academic Planning and Reviews

2020-21 UTQAP Review of FASE Institute of Biomedical Engineering – Administrative Response

v5 2023-02-01 10:58 AM

Appended to January 27, 2023 letter from FASE Dean Chris Yip to Vice-Provost, Academic Policy & Programs, Susan McCahan; Updated on February 1, 2023.

Please do the following for each recommendation in the table:

- If you **intend** to act on a recommendation, please provide an **Implementation Plan** identifying actions to be taken, the time frame (short, medium, long term) for each, and who will take the lead in each area. If appropriate, please identify any necessary changes in organization, policy or governance; and any resources, financial and otherwise, that will be provided, and who will provide them.
- If you **do not** intend to act on a recommendation, please briefly explain why the actions recommended have not been prioritized.
- In accordance with the UTQAP and Ontario's Quality Assurance Framework, "it is important to note that, while the external reviewers' report may include **commentary** on issues such as faculty complement and/or space requirements when related to the quality of the program under review, **recommendations** on these or any other elements that are within the purview of the university's internal budgetary decision-making processes must be tied directly to issues of program quality or sustainability" (emphasis added)
- You may wish to refer to the [sample table](#) provided by the Office of the Vice-Provost, Academic Programs

Request Prompt <i>verbatim from the request</i>	Rec. #	Recommendations from Review Report <i>verbatim from the review report</i>	Program Response	Dean's Response
The reviewers recommended the creation of an undergraduate program in Biomedical Engineering, to appeal to students with interests in biological applications (<i>note: in responding you may wish to situate your comments in the context of the Faculty's suite of undergraduate program offerings</i>).	1	"We strongly recommend the creation of an UG core program in BME (UG BME) to complement the existing core 8 programs in the FASE. This had been recommended previously, and aligns with the interests of the current Director. Currently, the Faculty's flagship Engineering Science program is the most competitive program and offers a Major in Biomedical Systems Engineering. An UG BME core program will appeal to students with interests in biological applications, as well as students with different skills that currently are not considering Engineering, and is expected to generate a high demand."	We intend to create a full undergraduate program in Biomedical Engineering at the University of Toronto if possible. The decision to start an undergraduate program will be determined by the Dean and Provost. Medium term goal (one to two years).	In addition to the Biomedical Engineering Systems major in the Engineering Science program, the Faculty recently combined the separate Bioengineering and Biomedical Engineering Minors that are available to all core Engineering programs into a single comprehensive offering. The Faculty is keen to see the interest in this minor and its offerings, which will help in developing a strategy around new undergraduate programming.
The reviewers recommended offering more electives within the graduate programs, both within the Institute and from other units, with consideration for the variety of students' backgrounds; they also recommended making some classes in the program more challenging.	2	"Provide more electives (courses in and outside IBME) considering the background of students, and make some classes more challenging."	Students can take electives outside of BME to fulfill their requirements. The issue is that students are unaware of this availability. The solution is to create greater communication with students, so they are aware of this possibility. Short term goal (six months).	The Faculty will work with BME to promote graduate course offerings both within FASE as well as across the Institution.

<p>The reviewers noted recent enrolment growth in the PhD, MASc, and MEng programs, with a decrease in MHSc enrolments, observing that this may reflect “strong interest in the design and engineering of new medical devices, rather than the clinical use of existing devices.”</p>	3	<p>“There has been a consistent growth of the PhD (28%), MASc (45%) and MEng (843%) programs and decrease of the MHSc program (-89%) over the last four years (2020 compared with 2016). The large increase in MEng and decrease in MHSc enrollment may reflect the strong interest in the design and engineering of new medical devices, rather than the clinical use of existing devices.”</p>	<p>We will be closing the clinical engineering program (MHSc and PhD). The required documents to close these programs are currently in FASE.</p> <p>Short term goal (six months).</p>	<p>We anticipate that the proposals to close the MHSc and PhD clinical engineering programs will come forward in our fourth governance cycle (April 2023) for approval.</p>
<p>The reviewers recommended implementing systems or procedures to track students’ progress through their programs, monitor advising and supervision, and to manage mutual expectations of students and supervisors.</p>	4	<p>“Better track student progress and enforce rules regarding student advising and supervision.”</p>	<p>We intend to create better tracking systems. We will do this through committee meeting reports and ensure students do them on an annual basis.</p> <p>Short term goal (six months).</p>	<p>FASE will work with BME, along with all cognate units, on identifying and encouraging best practises for tracking student progress.</p>
	5	<p>“A number of universities adopted letters of mutual understanding between the supervisor and student to help manage mutual expectations. Whereas the template of the letter is provided by the supervisor, the student could edit it to find mutual understanding.”</p>	<p>We do not intend to adopt such letters, as there is no tracking of comments from these letters or legality to these agreements. Instead, we intend to use committee reports to track progress. We will encourage to have 1-on-1 discussions with supervisor to discuss student/supervisor expectations.</p>	
	6	<p>“Track student progress to ensure that deadlines are met. Some universities have set up digital tracking systems to ensure students progress in their programs.”</p>	<p>We intend to use committee reports to ensure milestones are met with the student degree. We now create a clearer description of milestone expectations for students.</p> <p>Short term goal (six months).</p>	
<p>The reviewers recommended increasing the availability of student counselling, and ensuring that students are well-informed of resources for support and conflict resolution.</p>	7	<p>“Increase the availability of student counselling and better inform students of opportunities regarding conflict resolution at UofT and of the contact information of mediators, as students were not aware of it.”</p>	<p>We intend to redesign our website to provide all necessary counselling and conflict resolution resources for students. SGS and University has created resources for support of these activities; it would be redundant for a division to create a similar structure.</p> <p>Short term goal (six months).</p>	<p>FASE will work with BME to promote the wellness and support resources that are provided by FASE, SGS and the University</p>

Noting strong demand for IBME programs and the importance of maintaining its position as a leader in the field, the reviewers recommended that IBME develop a faculty complement plan to increase the number of core faculty over the next several years; they also recommended that faculty recruitment be carried out with participation of the Faculties of Medicine and Dentistry, and that recruitment should emphasize the diversity of the faculty complement.	8	“Therefore, we recommend increasing the number of core IBME faculty from 18 FTEs to 28 FTEs over the next five years by continuing strong BME faculty recruitment with participation of the Faculties of Medicine and Dentistry and other programs at UofT.”	We intend to hire new faculty to increase the FTEs to a minimum of 28. We will discuss with the FOM and FOD departments on hiring to increase FTEs. We will develop partnerships with divisions within FOM (e.g., Immunology, LMP, Medical Biophysics). There are clear synergies between BME and other departments in FOM and FOD. We will identify the synergies for new faculty hiring. Medium term goal (one to two years).	FASE will monitor the hiring strategies for BME and in particular, its coordination and collaboration with other divisions in areas of mutual strategic interest.
	9	“Emphasize diversity in future faculty recruitment.”	We always emphasize diversity in future faculty recruitment.	This is an important area for FASE and one in which all units are actively encouraged to emphasize in all recruitment activities. The FASE EDI office will work with BME on best practises for encouraging a diverse applicant pool for faculty positions.
The reviewers made a number of recommendations to support faculty career progression, including providing feedback and guidance on promotion pathways and promotion processes for teaching stream and pre-tenure faculty, formalizing a mentorship program for junior faculty, and providing additional guidance on career development for post-tenure faculty.	10	“Clarify tenure track procedures for teaching stream faculty.”	We intend to clarify tenure track procedures for teaching stream faculty through annual meetings. We will follow the guidelines for FASE and will relay that information to the teaching stream faculty. Short-term goal (six months).	The Faculty has created procedures and guidelines to help clarify promotion to continuing status for teaching stream faculty. Examples include the <i>FASE Guidelines for the Assessment of Effectiveness of Teaching in Tenure, Continuing Status and Promotion Decision</i> and the <i>FASE Best Practices for Assessing Teaching Effectiveness in PTR Decisions</i> (the latter pending April 2023 Council approval).
	11	“Provide equitable awards for teaching stream faculty.”	We do not intend to create department awards for teaching stream faculty. The reason is because there are only two teaching stream faculty in BME. If BME hires more teaching stream faculty, it will make sense to create awards. However, we will nominate our teaching stream faculty for awards when there is a call for them.	The Faculty welcomes an opportunity to provide an update on efforts to broadly encourage teaching excellence in BME, and across the division.

	12	“For pre-tenure faculty members, provide feedback and more guidance on the tenure progress, and on whether to apply for promotion during annual review.”	<p>We intend to discuss and provide guidance for pre-tenure faculty members annually during the annual review of the faculty member. We have bi-annual luncheons with pre-tenured faculty. Since the review, the pre-tenure stream faculty has started lunches with each other every 3-4 months to discuss challenges and needs. The Director organizes these luncheons and will meet to discuss and provide solution to these challenges.</p> <p>Short-term goal (six months).</p>	<p>The Faculty has created procedures and guidelines to help clarify promotion processes for tenure- and continuing-stream faculty.</p> <p>Examples include the <i>FASE Guidelines for the Assessment of Effectiveness of Teaching in Tenure, Continuing Status and Promotion Decision</i> and the <i>FASE Best Practices for Assessing Teaching Effectiveness in PTR Decisions</i> (the latter pending April 2023 Council approval).</p>
	13	“For post-tenure faculty members, provide more guidance as to what is needed for the next step of tenure. This can be done through annual review.”	<p>We intend to provide guidance to post-tenure faculty members to the requirements for promotion during annual review.</p> <p>Short-term goal (six months).</p>	
	14	“Formalize a faculty mentorship program to better help junior faculty.”	<p>We do not intend to create a formalized program for faculty mentorship program with junior faculty. Although idealistically interesting, these mentorship programs have never performed well. Instead, we intend to create a culture of interactions between junior and senior faculty which will make the new faculty more comfortable to ask questions for support of their career.</p> <p>We will create this culture by regular luncheons between faculty and to create joint projects where senior/junior work seamlessly together. We will discuss with other departments on best practice. We will take an iterative strategy to develop academic leaders. It starts with assigning committee leads, and then these leaders will advance to Associate Director positions.</p> <p>Short-term goal (six months).</p>	<p>The Faculty will monitor the roll-out of these approaches in BME to assess their effectiveness.</p>

<p>The reviewers recommended strengthening communications with faculty regarding plans and decisions being made by IBME leadership; they recommended holding monthly Institute meetings to discuss plans and solicit feedback.</p>	15	<p>“Hold more regular institute meetings to discuss plans and obtain feedback. Monthly meetings are a common standard.”</p>	<p>We do not intend to hold monthly meetings. We hold 3-4 meetings per year plus an annual whole day retreat. Aside from a few faculty, most faculty are content with this number of meetings. We do intend to send out emails with information on the Institute activities, that would be part of communication with faculty of BME events and decisions.</p> <p>Short-term goal (six months).</p>	<p>The Faculty believes in the importance of regular communications and information sharing and looks forward to providing a one-year update on BME’s approaches.</p>
	16	<p>“Strengthen communications with faculty and communicate plans, decisions and rationale.”</p>	<p>We intend to increase communication with faculty on decisions and rationale in faculty meetings. Most of these discussions occur at the faculty meeting and retreat. Unfortunately, not everybody attends to the meetings. We will create a more efficient way of disseminating information to faculty.</p> <p>Short-term goal (six months).</p>	
<p>The reviewers noted a lack of state-of-the-art infrastructure at the IBME, and recommended ways of supporting space and facilities growth including establishing core facilities to be shared among IBME faculty, refurbishing existing space, and integrating with other units.</p>	17	<p>“We recommend supporting IBME growth with new space and facilities, since IBME lacks state-of-the-art infrastructure. The expansion of research space could be a combination of having one or two floors in a new building, refurbishing existing IBME space, integration with other units, etc. Having more IBME office space will help build greater culture and better collaboration within IBME.”</p>	<p>We intend to increase the amount of BME space through refurbishing of the Mining and Roseburgh buildings.</p> <p>Since the review, we have created over 6000 sq ft of new wet-lab space and are in the process of creating over 5,000 sq ft of new faculty offices, student space, and administrative space. We expect to move into this space in the next six months.</p> <p>We plan to start to construct another 4000 sq ft of biosafety level 1 space in the Mining building in the next two years.</p> <p>Medium-term goal (one to two years).</p>	<p>BME has been very proactive in upgrading and improving infrastructure. We will monitor the progress of these changes and the impact that they are having on BME’s operation.</p>
	18	<p>“Establish core facilities that IBME faculty can share.”</p>	<p>We intend to create core facilities for BME faculty to share. We expect this facility to be in the new Roseburgh wet lab. We plan to</p>	<p>We welcome the opportunity to provide a one-year update as these renovations come on-stream.</p>

			<p>start to apply for grants to purchase equipment for this core facility. This core facility will be made available to the Engineering and broader community. We are in discussion with the FOM to develop the BSL3 and animal facility. These facilities will be accessibility to BME and Engineering researchers.</p> <p>Medium-term goal (one to two years).</p>	<p>We will monitor the effectiveness of these changes as the renovations come on-stream.</p>
	19	<p>“Improve the size and quality of administrative space.”</p>	<p>We intend to create the size and quality of administrative space.</p> <p>Since the review, we re-constructed an old space to new administrative space (3rd floor Mining Building). We expect move into this new administrative space in June 2023.</p> <p>Short-term goal (six months).</p>	<p>We will monitor the improvement of the size and quality of administrative space as this new space is commissioned.</p>
<p>The reviewers recommended that IBME develop a communication and partnership strategy to enhance relationships with other units within the Faculty of Applied Science and Engineering, as well as with the Temerty Faculty of Medicine and the Faculty of Dentistry; communication themes include student and faculty recruitment, faculty performance evaluations, tenure processes and criteria, teaching and evaluation, research, and strategic initiatives.</p>	20	<p>“Develop a communication and partnership strategy on how to efficiently communicate and liaise with departments within the FASE, as well as with departments in the Faculties of Medicine and Dentistry. The themes include recruitment, faculty performance evaluations and tenure process and criteria, UG and graduate student recruitment, teaching and evaluation, research, and strategic initiatives.”</p>	<p>We intend to communicate the Institute’s activities with other entities through annual magazines, meetings at the Dean’s level, and chairs/director’s luncheons.</p> <p>We have created a website that features research activities and partnerships (https://discover.bme.utoronto.ca/), annual magazines that is disseminated in BME, University, and outside of the University, and development of full social media campaign. They provide communication and showcasing of BME activities in and out of Toronto.</p> <p>We will continue to improve these communication stream. We will monitor the readership and distribution network of these communication media and adjust accordingly.</p> <p>Short-term goal (six months).</p>	<p>The Faculty places a high priority on efficient and timely communications with both internal and external stakeholders. We look forward to reporting on the outcomes of BME’s communications strategy.</p>

Other recommendations not prioritized in the Request for Administrative Response	21	“Increase student stipends in consideration of the high price of Toronto housing and inflation.”	<p>We will increase student stipends, taking a gradual approach. This year is the first of several stipend increases for students.</p> <p>We expect to increase the amount of stipends by MASc and PhD students from 10-15% next year and 5% annually afterward.</p> <p>We will continue to discuss strategy to increase stipends with FOM and FOD. FOM has been more aggressive with stipend increase. We will find a stipend increase rate that is amenable to our researchers in FASE, FOM, and FOD.</p> <p>Short term (six months) to medium term (one to two years) goals.</p>	We have begun discussions at the Faculty level about student funding and are awaiting input from IBME. We look forward to reporting on the implementation of these funding strategies.
	22	“Increase clarity about internal awards. Currently the website is confusing to navigate, and deadlines are not updated in timely manner. Some internal awards were not shared adequately.”	<p>We have already increased clarity on internal awards after the review. We created monthly email letters with dates and award purpose to trainees.</p> <p>Already addressed.</p>	
	23	“Provide adequate support to faculty teaching large classes (TAs, etc.)”	<p>We have increased the number of TA support for faculty teaching large classes.</p> <p>Already addressed.</p>	The Faculty will monitor the effectiveness of BME’s initiatives in support of teaching and experiential learning.
	24	“Send the list of IBME staff and their administrative responsibilities to all graduate students in IBME.”	<p>We have added in our website the responsibilities of BME staff and administration (https://bme.utoronto.ca/contact/). At the beginning of each year, we will provide a list of the administrative staff and provide a list of their responsibilities.</p> <p>Already addressed.</p>	

	25	“Track student employment and field in year upon completion to track percentage of placement among job seekers.”	<p>We have created social media engagement (e.g., LinkedIn) to track student employment. This allows us to track our alumni. From this tracking system, we have spreadsheets for tracking and provided this information to Advancement and Alumni relations in FASE and FOM.</p> <p>Already addressed.</p>	This is certainly a critical area and one that the Faculty has been prioritizing as the new Defy Gravity campaign launches. The Faculty looks forward to working with BME on their broad advancement and engagement plans
	26	“Address the drop in IP applications that result from institutional IP application challenges.”	We do not intend to address the IP application challenges. This issue is not specific to BME but is associated with the IPO office at the University. The IPO continues to have re-organization issues and they do not provide clarity on how IP is handled as well as the assigned handler. We will discuss this issue with FASE VDR to assist the IPO office in dealing with BME IPs.	We will monitor the engagement between BME and IPO, as well as more broadly at the Faculty level.
	27	“Consider resuming the position of Associate Director of Research, with the position’s roles clearly defined. It had a defined mandate and resourcing before, but these may need to be redefined.”	We do not intend to add the position of Associate Director of Research. Practically, the main function appears to attend FASE meetings. We currently send a representation from BME to these meetings. We discussed this comment with BME advisory group, and we felt that this position was not needed. Despite not having a person designated for this position, our funding per faculty has more than doubled in the last four years.	The Faculty values the strategic input provided by members of its Research Committee, which is comprised of the Associate Chairs / Directors of Research from the cognate units. The Faculty will, through the Vice-Dean, Research’s office, work on identifying best practices and key mandates for those in these roles.
	28	“Spearhead the expansion and transformation of BME in Canada, along with peer institutions.”	<p>We intend to help expand and transform BME in Canada. We participate in BME chairs meetings to discuss Canadian BME programs and have been the main organizers of these meetings.</p> <p>The IBME director has led the discussion with CIHR to create multiple BME committees. In the last two cycles, there have been two BME</p>	We will monitor the effectiveness of BME’s advocacy efforts, both nationally and internationally.

			committees and the funding for BME research has doubled.	
	29	“Be attuned to the developments of BME in North America and globally, and orient IBME with leading programs.”	We have been following the developments of BME in North America and globally. We already track publications, funding, student supports, etc. We use this information to guide our decision and to develop programs in BME in Toronto to compete globally. Already addressed.	

3. Committee on Academic Policy & Programs (AP&P) Findings

The spokesperson for the reading group reported that the review summary accurately described the full review and that overall, they had found the review to be positive. The reading group reported that the Dean's administrative response had adequately addressed issues identified by the review, however, asked the Institute to further comment on need for communication around electives, the role of teaching stream faculty, diversity in hiring, and mentorship.

Professor Warren Chan, Director, Institute of Biomedical Engineering commented that:

- Departmental communications had been enhanced through improved technological access, such as utilizing SharePoint, creating a newsletter to share information and implementing a single source site.
- The growth of BME in Canada was emphasized, as was the heavy competition for talent in the field. As such, the unit noted the need to increase BME faculty complement where possible, in order to compete globally.
- IBME has welcomed and explicitly encouraged diverse candidates to apply to available positions; and a diverse committee considers applications. The unit has been attending annual BME Society workshops on diversity and indicated plans to undertake unconscious bias training and work more closely with FASE's EDI Director going forward.
- An informal system is in place, which tailors mentorship to new faculty based on their needs. The unit considered a more formal structure but found this sometimes resulted in fewer meetings. A dynamic, fluid approach helps match faculty with appropriate mentors.
- Implemented decision-based meetings and have established an annual retreat.

No follow-up report was requested.

4. Institutional Executive Summary

The reviewers praised IBME's rapid growth and evolution with its field over the past 25 years, describing it as "one of the crown jewels" of the University. They commended the excellent graduate programs, noting the consistent growth of the PhD, MASc and MEng programs in recent years. They praised the outstanding, productive core faculty with good balance across various ranks, and successful BME-centric research initiatives. They commended the recent reorganization and streamlining of IBME, as well as the effective governance structure. They also praised IBME's strong ties with the Faculties of Medicine and Dentistry, and with other FASE units, as well as the positive morale maintained throughout the Institute during the COVID pandemic.

The reviewers recommended that the following issues be prioritized: the creation of an undergraduate program in Biomedical Engineering; offering more electives within graduate programs both within the Institute and from other units; implementing systems or procedures to track students' progress through their programs; increasing the availability of student

counselling; the support of faculty career progression; strengthening communications with faculty regarding plans and decisions being made by IBME leadership; supporting space and facilities growth noting a lack of state-of-the-art infrastructure; developing a communication and partnership strategy to enhance relationships with other units within FASE as well as with the Temerty Faculty of Medicine and the Faculty of Dentistry.

The Dean's Administrative Response describes the Faculty and Institute's responses to the reviewers' recommendations, including an implementation plan for any changes necessary as a result.

5. Monitoring and Date of Next Review

Chairs and Directors in the Faculty of Applied Science and Engineering are expected to report on progress made toward their external review goals at least annually at a meeting of the Chairs and Directors, chaired by the Dean.

The Dean will provide an interim report to the Vice-Provost, Academic Programs midway between the 2020-2021 review and the year of the next site visit on the status of the implementation plans.

The next review will be commissioned in 2026-2027 with a review visit expected in 2027-2028.

6. Distribution

On June 30, 2023, the Final Assessment Report and Implementation Plan was posted to the Vice-Provost, Academic Programs website and the link provided by email to the Dean of the Faculty of Applied Science and Engineering, the Secretaries of AP&P, Academic Board and Governing Council, and the Ontario Universities Council on Quality Assurance. The Dean provided the link to the unit/program leadership.