Cyclical Program Review of Academic Programs offered by the Department of Chemical Engineering

Progress Report on Implementation Plan: 4-year

Date: 3/18/2022

Contact: Brian Amsden Department Head amsden@queensu.ca

Programs	Degrees
Chemical Engineering	BScE, MASc, MEng, PhD
Engineering Chemistry	BScE, MASc, PhD
Biomedical Engineering	MASc, PhD

Table 1 Add/delete rows as required

At the conclusion of the cyclical program review, a final assessment report and implementation plan was agreed by the Teaching and Learning Office and the Deans of the Faculty of Engineering and Applied Science and the School of Graduate Studies. These deans are responsible for monitoring the implementation plan. This report is an important step in the overall cycle of continuous improvement and is an opportunity to reflect on, and document, the progress made on incremental improvements to address recommendations in the implementation plan.

Please complete the table below to report on progress made in the past 4 Years against the implementation plan. Add further explanation, if necessary, in the *additional notes* section.

Please complete this report and return it to quqap@queensu.ca by 2/25/2022. The Teaching and Learning Office will review this progress report. It will then be appended to the Deans' annual reports for the 2021-22 academic year, filed in the Office of the Provost and Vice-Principal (Academic). Please note that monitoring reports will be posted on the University web site.

March 22, 2022

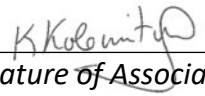
Signature of Unit Head *Date*

April 5 2022

Signature of Faculty Dean *Date*

April 8, 2022

Signature of Dean (SGS) *Date*



April 21, 2022

Signature of Associate Vice-Principal (Teaching and Learning) *Date*

Recommendations 4 and 5 were not endorsed by the Provost and Vice-Principal (Academic) and are not included in this report.

Recommendation 1: Reviewers' drew attention to the department's self-study report, and the frequent mention of the need for a "culture shift" with respect to competing for research funding.	
Proposed follow-up	i. Provide seed money from departmental discretionary funds to encourage and support large collaborative applications ii. Increase administrative support for grant application preparation and the administration of successful grants iii. Provide teaching relief for principle applicants preparing large collaborative grant applications iv. Internal sharing of best practices for grant applications v. Discuss issue at November 2019 departmental retreat
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	i. Ongoing ii. Ongoing iii. Ongoing iv. Ongoing v. Complete initial discussion at November 2019 retreat
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	N/A

What is the current status of the follow-up? **Include a completion percentage**	Completed proposed follow-up items but the department is committed to the continual improvement toward a collaborative research culture, and thus will continue assessing this over time. 100%
Please provide a brief description of the current, completed or planned work	i. The department has promised matching funds to support salaries (of $10 - 15,000/yr for 5 years) proposed in 2 NSERC CREATE applications that were unsuccessful, as well as providing funds as salary support for one successful CREATE application. The department Head has made it widely known to the faculty that such support will be offered for any large grant application. We are currently developing an additional annual opportunity of up to $25,000 to support new initiatives and/or as matching funds to support large grant applications. ii. We have just hired (January 2022) a Research Development Coordinator, Sophie Felleiter, whose job description includes providing administrative support for the preparation and running of successful large grants. Other duties for this position include: identifying and disseminating information about upcoming federal, provincial, local and industrial funding opportunities, developing a strategy for external networking with potential industrial partners, assisting in drafting contracts and IP agreements with industrial partners, providing assistance with grant writing, acting as a liaison between PIs and funding agencies and between PIs and Queen's University Research Services, and preparing and administering budgets for large research grants and contracts. iii. The possibility of teaching relief to prepare large grant applications is available, but has yet to be utilized. iv. We have created a Research Committee, with representatives from each of our research themes, to meet as needed to discuss strategies and best practices for applying to large grant opportunities. v. These issues were discussed at a department retreat in November 2019, where Faculty were reminded of the availability of matching funds for large grants, where we re-organized our research groups into 4 main thematic areas, and at which time we agreed to move ahead with hiring a Research Development Coordinator.

Recommendation 2: Reviewers recommend that all M.A.Sc. and Ph.D. students have regular (at least once a year) meetings with a supervisory committee that involves two formal elements: delivery of a presentation and submission of a written report	
Proposed follow-up	i. Actively enforce existing policy for all incoming PhD students ii. Discuss proposal to initiate yearly meetings for all MASc candidates at June departmental and graduate student executive meetings
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	i. Ongoing ii. Implemented by September 2019
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? **(If no, please indicate 'N/A')**	N/A
What is the current status of the follow-up? **Include a completion percentage**	In process 75%
Please provide a brief description of the current, completed or planned work	i. Faculty were reminded of our internal PhD student supervisory policy with the result that more Faculty members began to comply. Nevertheless, there are still too many PIs not in compliance. This issue has been identified as an area of concern that will be addressed this year.

	ii. The department discussed, and rejected, the proposal to have yearly meetings for all MASc candidates. The department felt that the additional work required would not provide any additional efficiencies in MASc time to completion.

Recommendation 3: Reviewers recommend that they were pleased to hear from the Dean about two new faculty positions planned for the unit. One of these positions would be at the intersection of engineering/medicine/clinical/mobility	
Proposed follow-up	Hire new faculty member with expertise at the intersection of engineering and medicine. Consider second hire in the area of biochemical engineering/synthetic biology
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	Complete second hiring process by 2020
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	N/A
What is the current status of the follow-up? **Include a completion percentage**	Completed 100%

Please provide a brief description of the current, completed or planned work	We have hired a new Faculty member, Dr. Kevin de France, whose research area is in polymer biomaterials for regenerative medicine applications. Dr. de France will be joining our department May 2022. We also received a QNS position in Systems Biology in 2018, which we used to hire Dr. Laurence Yang, who started in 2019. We have also proposed a new hire in Systems Biology/Synthetic Biology for recent CRC (2020) and CERC competitions (2022). Unfortunately, both proposals were not successful. We currently do not have any hiring opportunities available in this area (we will be hiring into our Process Control/Optimization area this year). Nevertheless, future hiring opportunities will be focused on this area.

Recommendation 6: Reviewers recommend that unit explore the idea of a professional master's degrees in key strategic areas with cognate departments to generate new sources of revenue. Different formats should be considered including on-line learning and intense short courses. An example would be the theme of "data analytics" that the unit would be well-positioned to lead.	
Proposed follow-up	Participate in the faculty-wide MEng professional master's program initiative
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	N/A

What is the current status of the follow-up? **Include a completion percentage**	In process >25%
Please provide a brief description of the current, completed or planned work	The development of a Faculty-wide MEng program has been ongoing under the portfolio of the Vice Dean of FEAS. The 2019 Program Proposal was temporarily paused with the shifting priorities of pivoting education during the global pandemic. However, this idea is now being revisited (as of March 2022). We will actively participate in providing elements of such a program once the details are more fully developed and/or departmentally relevant consultation is needed.

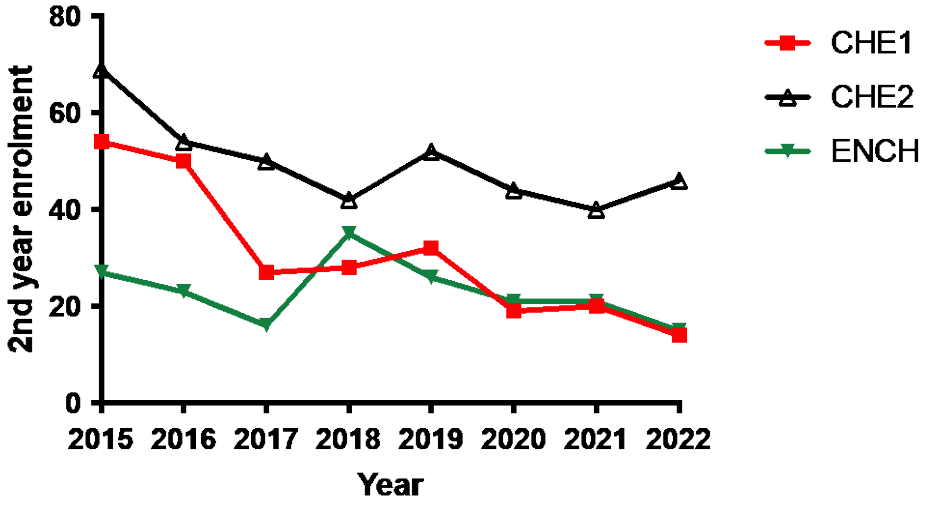
Recommendation 7: Reviewers recommend that the unit make efforts to increase the participation rate of undergraduate students in the internship program so that a greater proportion of students benefit from this form of experiential learning. Current participation is around 20% and the challenge is to move this to the critical point of 40-50%.	
Proposed follow-up	Implement strategies that will increase participation rates of undergraduate students in internship program. Leverage FEAS supports that help students with summer jobs, co-ops and internships
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? **(If no, please indicate 'N/A')**	N/A

What is the current status of the follow-up? **Include a completion percentage**	In process >50%
Please provide a brief description of the current, completed or planned work	The department regularly advertises the QUIP program and has provided opportunities for the QUIP program director to discuss these opportunities with our students, both during Orientation sessions at the beginning of the academic year and during our Discipline Orientation Nights each January. Further, we have highlighted the QUIP program on our department website in one of our news feeds (https://chemeng.queensu.ca/news/2021/03/queens-engineer-finds-a-surefire-career-path-at-procter-and-gamble-internship.html). The combined CHEE and ENCH registered participants in QUIP have gone from 44% of the total class enrolment in 2019-2020 to 63% in 2021-2022. This growth is encouraging and we will continue our efforts to improve it further.

Recommendation 8: Chemical Engineering has recently enjoyed strong demand. Reviewers recommend that the unit play an active role in recruitment and outreach to make sure prospective students appreciate <u>both</u> undergraduate programs that the unit has to offer.	
Proposed follow-up	Continue current activities that inform prospective students of the opportunities in both Chemical Engineering and Engineering Chemistry
Responsibility for leading follow-up	Departmental head
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No

Which support units have been engaged as collaborators in supporting additional deliverables? **(If no, please indicate 'N/A')**	N/A FEAS Connections Engineering Outreach
What is the current status of the follow-up? **Include a completion percentage**	In process 50%
Please provide a brief description of the current, completed or planned work	At the time of the QUQAP review, demand for our CHEE (Process option (CHE1) and Bioengineering option (CHE2) and Engineering Chemistry (ENCH) programs was strong. Over the intervening years, the demand has eroded and is a concern (see Figure 1 below). We continue to participate in annual recruitment events with the support of both the FEAS Events Coordinator and the FEAS Marketing & Communications unit. We run annual Discipline Orientation nights as mentioned in Recommendation 7. Since the fall of 2019, eight distinct Faculty members in CHEE and ENCH have participated in the annual Fall Preview and the annual March Break Open House. After January of 2020, we altered these events so students could attend virtually via Zoom. We will continue to engage unit supports as needed to strengthen the demand for the CHEE and ENCH programs. Furthermore, we have discussed developing additional outreach activities targeting high school students. Initial plans were postponed, in large part due to the pandemic. However, we have begun to re-prioritize and initiate outreach activities through interactions with the Connections Engineering Outreach unit. We have also initiated a rejuvenation of our first year Chemistry curriculum with the objective of making the content more relevant to today's global sustainability challenges with the objective of engaging potential undergraduate students of the opportunities that a CHEE or ENCH degree will provide them in addressing these pressing global issues.

Figure 1. Second year enrolment



Recommendation 9: Reviewers strongly recommend that the university and FEAS introduce more central undergraduate student support to respond to the increasing demand for student accommodations.	
Proposed follow-up	Continue work on increasing centralized support for students seeking accommodations
Responsibility for leading follow-up	Dean, Faculty of Engineering and Applied Science
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No

Which support units have been engaged as collaborators in supporting additional deliverables? **(If no, please indicate 'N/A')**	N/A
What is the current status of the follow-up? **Include a completion percentage**	In process >75%
Please provide a brief description of the current, completed or planned work	The FEAS office has responded to this recommendation by creating the EngWell Hub, an interactive website providing students with resources to help "engineering their wellness" and support their individual needs for health and wellness during their time in our programs (https://engineering.queensu.ca/engwell-hub/). On the EngWell Hub, engineering-contextual workshops and resources are available relating to academics, mental/physical health, visa and immigration, technology, finances, healthy eating, housing, family abroad, and community involvement. In late 2021, FEAS also created and hired a new Mental Health Programs Lead, who will oversee not only the embedded student counsellor, but also a new Wellness Navigator; a role currently in development that is expected to be filled in 2022. Regarding accommodations more broadly, a university-wide system called Ventus has been adopted for the central management of all accommodations. Additionally, the exams office will be responsible for implementing all the arrangements required for accommodated students. The Department Head and Associate Head will continue to work with FEAS through the Associate Dean Academic (and Student Services as needed) to ensure centralized support for accommodation requirements.

Recommendation 10: Reviewers recommend that new additional undergraduate courses not be added, or if they are, that an equivalent number of courses be removed. There is a potential for enrolment growth on the Engineering Chemistry side and as new courses are added for that program, there should be commensurate reduction on the Chemical Engineering side.	
Proposed follow-up	Continue curriculum review of all undergraduate courses under the guidance of the Centre for Teaching and Learning
Responsibility for leading follow-up	Department head
Timeline for addressing recommendation	By July 2019
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? **(If no, please indicate 'N/A')**	N/A
What is the current status of the follow-up? **Include a completion percentage**	In process >75%
Please provide a brief description of the current, completed or planned work	As noted above, we offer two options (or subplans) in our undergraduate CHEE program: a Process option (CHE1) and a Bioengineering option (CHE2). As part of a curriculum review, we examined our program offerings during the November 2021 departmental retreat, resulting in the formation of a committee mandated to merge these two options into one program. This recommendation arose from a need to update the content of our offerings so as to better connect the content with UN Sustainability Goals to address our enrolment decline (see comment to Recommendation 8). As a

	result, the number of courses offered will likely be reduced providing more flexibility for the students to take electives. The committee will be reporting their proposed new curriculum to the department at the April 2022 department meeting. We will then move the proposed changes through the appropriate administrative process. As the Engineering Chemistry program already adheres to two distinct accrediting bodies and thus requires an already heavy course load, we have no intentions of making any curriculum changes that would increase this load. The FEAS and the FAS senior leadership continue to meet regularly to ensure this unique dual-accreditation balance can be maintained.

Recommendation 11: Reviewers mention that the unit has the opportunity to redefine the disciplines of chemical engineering and engineering chemistry given that it is well-positioned at the interface of engineering and science with a well-established collaboration with the chemistry department.	
Proposed follow-up	Continue to explore opportunities that will refine the disciplines of chemical engineering and engineering chemistry
Responsibility for leading follow-up	Department head
Timeline for addressing recommendation	Ongoing
Are there additional deliverables associated with the proposed follow-up?	No
Which support units have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	N/A

What is the current status of the follow-up? **Include a completion percentage**	In process >75%
Please provide a brief description of the current, completed or planned work	The fundamentals of the chemical engineering discipline will always be industrially relevant. However, we have shifted the focus of the the applications of chemical engineering principles from primarily the oil and gas industry to alternative energies, bioengineering, and sustainable manufacturing processes. This shift is expected to be implemented in our new first year chemistry offerings and will be echoed throughout our curriculum, as noted in our comment to Recommendation 10.

Additional Notes:

Please note any additional issues affecting progress, if applicable.