FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

Software Engineering Technology

Date of Review: May 18 - 19, 2021

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 Software Engineering Technology Program. 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

In accordance with the Institutional Quality Assurance Process (IQAP), the W Booth School of Engineering Practice and Technology submitted a self-study in April 2021 to the Vice-Provost Faculty to initiate the cyclical program review of the Software Engineering Technology undergraduate program. 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 the CVs for each full-time member in the department.

Two arm's length external reviewers and one internal reviewer were endorsed by the Faculty Dean, W Booth School of Engineering Practice and Technology, and selected by the Vice-Provost Faculty. The review team reviewed the self-study documentation and then conducted a review on May 18-19, 2021. The review included interviews with the Provost and Vice-President (Academic), Faculty Dean, Vice-Provost Faculty, Associate Dean Academic, Program Chair of the B.Tech Software Engineering Technology Program within the W Booth School of Engineering Practice and Technology and meetings with groups of current students, full-time faculty and support staff.

The Program Chair of the B.Tech. Software Engineering Technology Program, the Chair of GENTECH and the Dean of the Engineering submitted responses to the Reviewers' Report (April 2022). Specific recommendations were discussed, and clarifications and corrections were presented. Follow-up actions and timelines were included.

The online format of this program presents unique challenges and opportunities. The reviewers found the program to be well placed to take advantage of the increasing demand for online studies. In particular, it helps to fill a particular demand for students wanting to complete their studies and upgrade their knowledge and skills part time. The program would benefit from improved communication, further means for students to collaborate and interact, and by fully embracing opportunities available to online-only instruction.

The following program strengths were identified:

This is a unique program that was designed from the beginning to use a 100% online format. As a degree completion program that requires incoming students to already have a college diploma, the format allows for students to complete their degree either full time or part time. The part time option is particularly appealing to students who work full time, and the courses are offered at times that help to facilitate this situation.

- Offers flexibility with evening and weekend courses and is therefore attractive for students who already hold fulltime employment outside of their university education.
- The program engages with industry experts and meets with them annually to discuss areas of improvement.
- Co-op program is very beneficial for students to find employment.
- The continuous evolution of the technical curriculum to meet the industry needs.
- The processes for curriculum improvement, resources, quality enhancement and system of governance is very strong.

The following areas of improvement were suggested:

Since the program is 100% online, the student experience could be enhanced by the program providing further means for students to interact and collaborate. Students would also greatly benefit from better communication regarding program information such as options and offerings.

- Student Interaction: Provide opportunities for students to interact more often with peers and alumni.
- Make information pertaining to course requirements, options, electives, etc. more easily accessible to students.
- Improve the representation of female students, and other underrepresented groups.
- Improve the accessibility of the program to help students who cannot attend the live lectures.
- Ensure diversity in the panel in terms of the representatives as well as the diversity in expertise. Formalize the roles of the industry panelists, setting expectations, and get written feedback on areas of improvement.
- Define opportunities for students to engage with faculty members who have an active research profile.

- Reduce the teaching load of the faculty members since it is a fully online program, and this will allow the faculty members to pursue novel pedagogical approaches to improve the effectiveness of the teaching in an online environment.
- Faculty members with significant student supervision and/or research should have a lower teaching load. This is important for faculty members who seek promotion to full professor, as promotion to full professor requires evidence of robust pedagogical research, which is likely quite difficult under the current setup.
- Explore opportunities to internationalize the program, especially given its online nature, to recruit international students who do not necessarily need to travel to Canada to complete their studies.
- Offer bridge courses to help students meet the standards in entry level math and statistics courses.
- Align the curriculum to be closer to name of the program, and introduce courses in databases and enterprise architecture.
- To serve the program in the 4 areas increase the number of full-time faculty members and offer streams or concentrations with specific learning paths.
- The current GENTECH courses are not contextualized and are fairly general for all streams. This does not serve the software students well. Better integration of the technical and GENTECH courses are needed, with the latter covering topics pertaining to software graduates.
- Pedagogical explorations pertaining to asynchronous delivery, replacing exams with micro-assessments, and curation of learning resources beyond the textbook and notes, should be undertaken.
- Computing resources such as laptops for sessional instructors is desirable.
- A dedicated IT person for the software program is desirable.
- Round the clock access to software like minitab is desirable.
- Hire more full-time tenure track faculty members (at least 3 in the next 3 years) in the program to attract and retain talent.
- Keep track of time-to-graduation to plan the offering betters.
- Quality indicators through student and instructor surveys should be done for the program instead of the entire school.
- Have smaller class sizes and offer multiple sections for quality education.
- Develop collegial governance structures in which decisions are made in consultation with the students, faculty members and the department director.

More specific areas program enhancement described in the report are directly reflected in the recommendations, discussed below.

Implementation Plan

Note: In the table below the following personnel are indicated by their initials:
Dr. Seshasai Srinivasan – _SS; Dr. Jeff Fortuna – _JF; Dr. Marjan Alavi – _MA; Dr. Zhen Gao – _ZG; Mr. Mike Justason – _MJ; MM – _Ms. Michele Mantock; BB – _Dr. Brian Baetz

Recommendation	Proposed Follow-Up	Responsibility for Leading Follow-Up	Timeline for Addressing Recommendation
Student Experience			
i.Create opportunities for students to interact with one another on a more frequent basis, given the online nature of the program.	i.Involve group projects, engage students in BRIC activities.	SS & Booth School Members	Winter 2022
ii. Create further opportunities for interaction with, and among, alumni.	ii. Advertise BSU events, graduation events, and socials	SS & Admin Staff	Fall 2022
iii. Improve communication with students regarding program requirements and options.	iii. Communicate more effectively through the cohort shell created on Avenue to make important announcement; keep the website updated.	Admin Staff	Ongoing
iv. Develop systematic mechanisms to address any imbalance in the student population with respect to underrepresented communities.	iv. Train with EDI office at McMaster, participate in recruiting and promotion activities, follow through with the strategic plan of the Booth school that has this component.	JF, MA, ZG	Summer 2022
Community Engagement			
i. Formalize the process of inviting industry professionals to be part of the industrial advisory board, including seeking diversity on the panel.	i. Currently 2 out of the 3 industry advisors are from visible minority group with one member being a female. More members will be added in the coming years.	SS	Ongoing
ii. Retain the co-op program and expand it where possible.	ii. co-op will continue to be part of the program.	SS	Completed

Research i.If desirable and supported at the Faculty level, encourage research that is closely related to the areas of focus of the program. ii. Allow flexibility for faculty members, through reduced teaching load, to experiment with novel pedagogical approaches related to online teaching. iii. Explore the possibility of reduced teaching load for faculty members with significant student supervision and/or research.	i. The establishment of BRIC will serve well to encourage faculty members to undertake research. ii, iii. Faculty load reduction will be taken up with the Director of the school to determine how to account for pedagogical and domain research into the loads of the faculty members.	MA SS & BB	Ongoing Ongoing
Internationalization i. Explore opportunities for further internationalization.	i. The faculty recruitment is centralized and they undertake advertisement campaigns to offshore locations to promote all the programs, including the software program.	Admin Staff	Ongoing
Admission Requirements i. Offer bridge courses or mentorship programs as needed, in particular with respect to Mathematics courses.	i. A bridge course will be offered to cover fundamental math topics to ensure students have strong foundation for the higher-level math courses. The current math course is also be revamped to include more pertinent topics.	SS	Fall 2022

Curriculum i. Align program content and program title.	i. The program title was changed a few years back to the current title. We believe that since the curriculum is posted clearly on the website and our outreach activities explain the various flavours, we won't be misleading the students.	SS	-
ii. Consider including courses on databases and on enterprise architecture.	ii. We will pitch this to program advisory committee and seek their inputs before offering courses on these topics.	SS	Summer 2022 – Fall 2023
iii. Consider how best to grow the program in the four focus areas (software design, networking & security, AI & data science, and multimedia & computer graphics): i.Focus attention on one or two areas, or hire additional faculty and staff to be able to add sufficient courses in these areas ii. Consider designating such areas as streams or concentrations with specific learning paths.	iii. For the current as well as incoming students we will pitch the options as streams wherein the students can specialize in different areas, taking electives of their choice. To strengthen our expertise, we will take up a discussion at the faculty level to explore adding new fulltime faculty members in the software stream.	SS	Ongoing
iv. Consider tighter integration of technical and Gentech courses.	iv. Software specific GENTECH courses will be planned and offered exclusively to software students.	MJ	Ongoing
Teaching and Assessment i. Review advances in pedagogy as it relates to the online nature of this program, and how such advances might be incorporated.	i. The faculty members are actively engaged in pedagogical research as well as pedagogical experiments inside the classroom.	SS	Ongoing

Resources to Meet Program Requirements a. Assist part-time and sessional lecturers in obtaining access to appropriate hardware to deliver their courses.	a.Resources are being provided to sessional as well as full-time faculty members and we are ramping up support. We will work in coordination with the department Director and the Business Manager to explore allocation of more funds to make additional procurement in the upcoming years.	MM, BB, and SS	2022-2026
b. Provide access to software required for coursework during the entire term, including outside of lab times.	b. We will work in coordination with the department Director and the Business Manager to explore allocation of more funds to facilitate additional procurement in the upcoming years.	MM, BB, and SS	2022-2026
c. Provide dedicated admin support for this program.	c. This will be taken up by the Director with the Faculty of Engineering to determine a plan that could allow for additional hiring.	BB	2023
Quality Indicators i. Systematically collect and monitor data on students' applications and registrations, time-to-completion, graduation rates, etc.	We will work with the staff members at the W Booth School to determine a mechanism for collecting this data.	Admin Staff, MM	Fall 2021
Program Enhancement i.Enhance quality of faculty resources.	i.We will work in coordination with the department Director and the Business Manager to explore allocation of more funds to make additional procurement in the upcoming years.	MJ & SS	2022-2023
ii. Provide dedicated staff support.	ii. This will be taken up by the Director with the Faculty of Engineering to determine a plan		2022-2023

	that could allow for addition hiring.		
iii. Expand curriculum into the four priority areas using advance planning and community engagement.	iii. Curriculum changes are done based on the recommendation of the industry panel and full-time faculty members. Going forward, we will also consult with sessional faculty members that teach in the software program.		Ongoing
iv. Integrate program components.	iv. Software specific GENTECH courses will be planned and offered exclusively to software students.		Ongoing
v. Establish a committee to review online delivery mechanisms and gradually introduce effective pedagogical innovations.	v. We currently have a pedagogical research committee that can be brought in an advisory role. Faculty members are routinely encouraged to adopt innovative pedagogical practices in the class and this will continue.		Fall 2022
vi. Retain and strengthen the co-op program.	vi. Co-op shall remain in the program.		Completed
vii. Investigate capping class sizes, introducing further sections or offerings, and/or capping admissions.	vii. We have noticed an explosion in enrolment in the software courses and are currently considering this for several software courses.		Ongoing
System of Governance			
i. Address the separate management of the technical and non-technical (GENTECH) aspects of the program.	i.Software specific GENTECH courses will be planned and offered exclusively to software students.	MJ & SS	Fall 2022
ii. Consider developing a collegial governance structure that includes consultation with students and faculty members, along with the department chair.	ii. Currently all full-time faculty members teaching in the program are consulted before making any major changes. This is implemented after approvals from the director and associate	SS	Ongoing

	director. Students are also consulted via townhall meetings when major changes are brought to the program. This practice will continue.		
Academic Services i. Curate and publicly share information on the program in an easy to access form for current and future students.	i. Information pertaining to the program is being regularly updated to the website. Information will also be regularly disseminated to the students enrolled in the program through mass emails and postings on our LMS.	Admin Staff, SS	Ongoing

Dean's Response

The program has taken advantage of the pandemic to create an opportunity. The major comments from the reviewers regarding interactions with the students are difficult in an online format although I suspect that our experiences will continue to shape how this is accomplished as we move forward. There are a couple of comments about the need for additional support. I would be happy to review this in comparison to other programs in the Faculty. The number of different programs until the SEPT umbrella is significant and the students need to feel supported.

Quality Assurance Committee Recommendation

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation, and the Committee recommends that the B.Tech. Software Engineering Technology program should follow the regular course of action with an 18-month progress report and a subsequent full external cyclical review to be conducted 7 years after the start of the last review.