FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

Civil Engineering Infrastructure Technology
Date of Review: June 15, 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 Bachelor of Technology (B.Tech) Civil Engineering Infrastructure 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 B.Tech. Civil Engineering Infrastructure Technology completion 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 June 15, 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. Civil Engineering Infrastructure 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. Civil Engineering Infrastructure Technology Program and the Dean of the Engineering submitted responses to the Reviewers' Report (November 2021 and April 2022, accordingly). Specific recommendations were discussed, and clarifications and corrections were presented. Follow-up actions and timelines were included.

The McMaster-Mohawk Bachelor of Technology (B.Tech.) Partnership is a successful university/college relationship that has a unique position in Canada. This collaboration gives the opportunity to students with an Advanced Diploma from Mohawk (or from another College) to pursue a Degree Completion Programs (DCP) in McMaster University to obtain a Bachelor of Technology (B.Tech.) degree in Civil Engineering Infrastructure Technology (CIV). It also provides a strong emphasis on management as students are required to take several management courses in addition to the technical courses. This results in a unique skill set that is highly attractive for employers. The B.Tech. in Civil Engineering Infrastructure Technology at McMaster University is a niche program, providing a high value-added to society by teaching technical and business skills to students who had previously completed college diplomas in Civil Engineering Technology, Architectural Technology, or Construction Engineering Technology.

The B.Tech. in CIV has been offered since 2006. In the past five years, the CIV program has produced 121 B.Tech. graduates. In Fall 2020, CIV's student population consisted of 142 students. CIV offers students a B.Tech. program in the area of Civil Engineering Infrastructure technology. CIV's program provides practical training, and the students are able to work during their studies. In the past five years, the number of Civil Engineering Infrastructure Technology students classified as 'part-time' ranged from 46-53% of the total, with the remainder classified as 'fulltime'. All CIV courses run during weekday evenings (6:30 – 9:30 pm) and on Saturdays (9:00 am – 12:00 pm or 1:00 pm – 4:00 pm) during the day for 12 months of the year, to accommodate working professionals. Some students completing the B.Tech. have gone on to pursue graduate school; some are pursuing licensure as professional engineers (P.Eng.); others are going on to technical careers in the civil engineering domain. The program was initially conceived to serve the Infrastructure Repair and Rehabilitation market, although the extent to which it is doing so is unclear.

Enrollment in the program has increased by approximately 25% since 2015/16. The results from a comprehensive in-course survey show a student satisfaction rate of over 60%, although this is a survey across all B.Tech. programs, and there is no specific data for the Civil Engineering Infrastructure Technology program.

In the past five years, the most significant update for the Civil Engineering Infrastructure Technology program was the 2018 PEO ARC (Academic Requirements Committee) Report and review of the program, which created a pathway of graduates to potential P.Eng. licensure: graduates of the Civil Engineering Infrastructure Technology program can now satisfy the PEO's academic requirements if they pass five PEO technical exams and submit a copy of a technical report. CIV is a unique technology program in Canada. It plans to continue being a leading program in Canada by continuing a direct interaction with the Professional Engineers of Ontario to facilitate the licensing of its graduates as P.Eng. This aspiration is consistent with the goals of McMaster University (to be recognized as one of the top innovation universities in the world) and the Faculty of Engineering (to make McMaster Engineering a truly world-class school of engineering) and attract outstanding students, employers, employees and partners around the globe.

Seventy-five percent of the Civil Engineering Infrastructure Technology are taught by sessional instructors. While sessional instructors from industry greatly contribute to the B.Tech. program, the quality, reputation, and consistency of course offerings may be improved if a further permanent instructor teaches the program. Further suggested enhancements to the program include expansion of technical elective offerings, increase of program admission cut-off, and maintenance of consistency in sessional lectures. For example, the expansion of technical elective offerings can be achieved by allowing the students to take some courses offered on Campus by other degree programs during regular working hours. Further flexibility to students could be achieved by enabling students to take asynchronous online courses or sections of courses.

The following program strengths were identified:

- The Program is unique in Canada and successful
- The Program produces graduates with an attractive mix of business and technical education that is in-demand by employers
- The Program has continued to grow since its inception in 2006
- Student satisfaction is high
- The Program was reviewed by the PEO ARC in 2018 and a prescribed pathway exits for graduates in pursuit of their P.Eng. (5 Exams + Report, with potential for only 2 Exams with 'good performance')
- The delivery and quality of the Program is consistent with McMaster's strategic priorities
- The Program structure offers a unique value proposition to students who are working full-time or part-time
- The Program has many highly skilled part-time lecturers (most working in relevant industry positions)
- Students appear happy with the quality of teaching
- The Program maintains relatively small class sizes (20-50)
- The physical space provided for the Program is adequate
- Morale among Staff seems high
- Graduates of the Program seem highly employable in addition to being capable of pursuing further studies (M.Eng., M.A.Sc., etc.)

The following areas of improvement were suggested:

- Add a second full-time Faculty member dedicated to the CIVTECH Program
- Expand the number of technical electives available to the CIVTECH students
- Offer some courses as blended in-person/virtual or completely asynchronous-online
- Increase admission cut-off average
- Maintain consistency in sessional lecturers / annual reviews for sessional lecturers
- Clarity on the rules surrounding the 're-taking' of courses for students who are not successful – request for clarity in the McMaster Course Calendar
- TAs appear under-utilized
- Negotiate with the PEO to further reduce the number of Exams for CIVTECH graduates

- Increase the number of courses offered at the 400/600 Level to improve the pathway to an M.Eng. Degree within the W Booth School

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

Implementation Plan

Recommendation	Proposed Follow-Up	Responsibility for Leading Follow-Up	Timeline for Addressing Recommendation
Add a second full-time Faculty member to the Program	This recommendation requires approval at the Faculty Level. The possibility of expanding the number of full-time Faculty members will be discussed with the Director of the W Booth School who will decide if this is possible.	M Justason / Brian Baetz	July 2022+
Expand the number of technical electives available to the CIVTECH students	Currently, CIVTECH students may choose one technical elective outside the CIVTECH Program (from Manufacturing, Software, or Power & Energy). The possibility of taking a technical elective (in the daytime) will be discussed with the Chair of the Dept. of Civil Engineering.	M Justason	July 2022, earliest implementation would be Sept. 2023
Offer some courses as blended in-person/virtual or completely asynchronous-online	Expertise related to this recommendation has been developed because of COVID-19. Students are already	M Justason	July 2022, earliest implementation would be Sept. 2023

	familiar with online and virtual learning as part of the GENTECH curriculum. A virtual/online conversion will be proposed to current long-serving sessional lecturers of the technical courses and, where appropriate, courses will be converted to online/virtual/or blended. Funding for this conversion would be required to ensure proper pedagogical practices. Courses may also be offered as 'hybrid' courses during a transition period. The idea of moving the entire CIVTECH Program to an online program will be discussed at the next Industry-Advisory Committee meeting.		
Increase admission cut-off average	The admission cut-off average has been increased from 75% to 80%, effective for the Fall 2022 intake.	M Justason	Complete – _will be effective Sept. 2022.
Maintain consistency in sessional lecturers / annual reviews for sessional lecturers	This recommendation is appropriate and currently being done within the framework of the sessional contracts and the available feedback mechanisms. Most sessional instructors are long-serving and of high quality. In the past, CIVTECH students	M Justason	Ongoing

	have been vocal when they felt course instruction was not of sufficient quality. An atmosphere where students feel comfortable making these types of complaints will continue to be cultivated.		
Clarity on the rules surrounding the 're-taking' of courses for students who are not successful – request for clarity in the McMaster Course Calendar	B.Tech. students currently follow the same rules for continuation in their Program (and repeating courses) as Engineering students. An inquiry/attempt will be made to clarify these requirements in the McMaster Course Calendar.	M Justason / Sarah Sullivan	September 2022 (next Course Calendar review)
TAs appear under-utilized	The Program Chair will communicate this observation to the CIVTECH sessional instructors and request that they consider making greater use of their TAs. Where appropriate, permission to hire Graduate TAs from the Dept. of Civil Engineering will be investigated.	M Justason / Sarah Sullivan	January 2022
Negotiations with the PEO to further reduce the number of Exams	A re-review of the Program by the PEO is due in 2021. The Program Chair has been in communication with the PEO and is awaiting further instructions (the 2018	M Justason	2021-2022 (depending on the PEO ARC)

	review had a term of 3-years). The PEO ARC (Academic Requirements Committee) is unlikely to change the current prescription of 5-Exams + Report (2-Exams are possible for 'good-performance'). This is a favourable assessment for a College-to-University Program. There has not been any significant change to the CIVTECH curriculum since the 2018 review. There is little justification to negotiate fewer Exams; unless, the PEO has seen very strong performance from CIVTECH applicants on their Exams.		
Increase in 400/600 Level Courses	This is an excellent suggestion, and it will be explored. Currently, CIVTECH students can take 3 courses at the 400/600 level (Project Mgmt; Building Science; and Technical Communications). A fourth course has been proposed (Entrepreneurship) and may be added to the curriculum in 2022/23. Adding additional courses at the 400/600 level will be investigated in collaboration with the Associate Director of Graduate Programs.	M Justason / Vlad Mahalec	September 2022 or 2023, pending the deadline for curriculum changes affecting the School of Graduate Studies

Dean's Response

The comments of the reviewers are for the most part consistent with the reviews of the other programs, highlighting the need for additional full time faculty members and the need for new staff. The comments about the PEO are appropriate and I am pleased that we are looking to reduce the number of exams required for these students. The addition of new courses is an excellent suggestion - it may be prudent to consider looking to programs outside of the Booth School and crosslisting since many of the courses may be available in other departments in the Faculty.

Quality Assurance Committee Recommendation

McMaster's Quality Assurance Committee (QAC) reviewed the above documentation, and the Committee recommends that the B.Tech. Civil Engineering Infrastructure 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.