Illustrative Example for Addressing 2.1.2.4.b)

University of Guelph, BEng.MTE, Bachelor of Engineering in Mechatronics Engineering

The University of Guelph's Mechatronics (BEng) program was recognized by the Quality Council's Appraisal Committee as an exemplary model for addressing the requirements of QAF 2.1.2.4.b) in a new program proposal for a professional (accredited) program.

The Committee commended the program for its comprehensive and sophisticated approach to the ongoing collection and analysis of program quality monitoring, as well as its clearly articulated assessment plans.

Additionally, the Committee highlighted the effective integration of Canadian Engineering Accreditation Board (CEAB) processes to support continuous program improvement, making this submission a good exemplar for meeting the expectations of QAF 2.1.2.4.b) in professional (accredited) programs.

BENG.MTE: Mechatronics Engineering, Bachelor of Engineering (Honours)

Continuous Improvement

Describe in detail plans for documenting and demonstrating the overall quality of the program and in particular student achievement of the program learning outcomes. Describe how these plans will be used to support the continuous improvement of the program.

The School of Engineering has an assessment and continuous improvement plan in place that is common across its undergraduate programs. The proposed Mechatronics Engineering program will follow this plan, with some variations specific to Mechatronics.

Engineering programs are externally accredited by the Canadian Engineering Accreditation Board (CEAB) and this drives many of our assessment and improvement efforts. The CEAB focuses on the achievement and improvement of twelve Graduate Attributes (GAs). Our Program Learning Outcomes are mapped to these Graduate Attributes; learning outcomes that are specific to the Areas of Emphasis are in addition to the GAs. As part of the accreditation process, each GA is broken down into three or more indicators, which we may think of as sub-learning outcomes. The indicators are linked to student assessments using Course Outline Manager software and we create curriculum maps showing how each GA indicator is achieved at three different levels as students progress through the program.

The results of these assessments are collected on a regular basis through Courselink, Gradescope, and Qualtrics surveys. We create histograms of student performance for each GA indicator and ask for faculty feedback for continuous improvement.

Faculty panels review and analyse these summaries to check for student achievement of the GAs at increasingly high levels as students advance through their degrees. This allows each engineering program to show that its students succeed in achieving each GA. It also allows faculty to look for weaknesses, thin spots or declines in GA coverage. When any weakness or decline is perceived, a recommendation for improvement is created.

Frequent group meetings, including a summer retreat, with faculty and technical staff specifically involved in Mechatronics Engineering may also trigger recommendations. We will discuss students' progress and performance on assessments like exams and quizzes, and will specifically monitor students' performance in those courses that lay the foundation for success in the Mechatronics program. If we realize students lack adequate preparation background in some areas, we will discuss how to address these deficits by including more background material or providing more support in tutorials and labs. We will also regularly examine student GPA and retention for each cohort, so that we can investigate any problems, and plan adjustments as needed. Faculty can also reach out to share feedback or discuss issues with the Area Head.

As part of the School's continuous improvement process, program stakeholders, including alumni, faculty, graduate employers, co-op employers and graduating students, are regularly probed through surveys and other consultations for feedback on GA achievement as well as overall program quality, strengths, and weaknesses. These consultations also generate recommendations.

Recommendations are tracked as they go through the process of review and completion. This ensures that we "close the loop" and complete the improvement recommendations that we have created.

Recommendations are discussed at the Curriculum Committee that is specific to Mechatronics. At present, the Curriculum Committee is the initial steering committee that developed the program. Curriculum committees, comprised of faculty and students, meet regularly to review the curriculum for the program(s) they are responsible for and make recommendations to their program committee (in this case, the BEng Program Committee), which, in turn, makes recommendations to the Board of Undergraduate Studies and Senate.

The University's Cyclical Review process also guides quality and continuous improvement activities; these sometimes overlap with CEAB requirements and are sometimes complementary to them. The rigorous GA data collection required by the CEAB means that each program has a well-defined process for monitoring and assessing the achievement of learning outcomes in the form of Graduate Attributes. The CEAB process also emphasizes continuous improvement actions, particularly when these pertain to GAs or the accreditation process. The Cyclical Review process, on the other hand, is somewhat broader in scope, emphasizing stakeholder input and the incorporation of IEDI as part of the curriculum. Both CEAB accreditation and the Cyclical Review process provide substantial feedback to academic programs, and a timescale for completion to help programs "close the loop" on improvements. Between the requirements of these two quality assurance mechanisms, the Mechatronics Engineering program has a solid framework for assessment and continuous improvement.