Final Assessment Report and Implementation Plan

Department of Civil Engineering

Undergraduate Programs

Faculty of Engineering

September 2024

Cyclical Program Review for
Department of Civil Engineering
Faculty of Engineering

Final Assessment Report and Implementation Plan

Programs Reviewed

Engineering Technology Diploma (Civil Engineering)
Bachelor of Engineering (Civil Engineering)
Bachelor of Engineering (Civil Engineering) – Co-operative Education/Internship option

Review Team

Dr. Faouzi Ghrib,
University of Windsor,
Windsor, ON

Dr. C. MacKinnon, Professor
Department of Chemistry, Lakehead University
Thunder Bay, ON

Background

In accordance with the Lakehead University Institutional Quality Assurance Process (IQAP), a Final Assessment Report has been prepared to provide a synthesis of the external evaluation and internal response and assessments of the undergraduate programs offered by the Department of Civil Engineering in the Faculty of Engineering. This report identifies the significant strengths of the programs, the opportunities for program improvement and enhancement, and sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies:

- the group or individual responsible for providing resources needed to address recommendations from the external reviewers or action items identified by the university;
- who will be responsible for acting on those recommendations; and
- specific timelines for acting on and monitoring the implementation of those recommendations.

Review Summary

The Department of Civil Engineering, a unit in the Faculty of Engineering, submitted a Self-Study in September 2017. Volume I presented the program descriptions and outcomes, an analytical assessment of the program, and program information along with institutional information and statistical data. Volume II provided course syllabi. Volume III provided the CVs for core faculty contributing to the delivery of the programs.

The Review Team for this cyclical program review included one external reviewer and one internal reviewer selected by the Senate Academic Quality Assurance Sub-Committee (SAC-QA) from a set of proposed reviewers. The reviewers examined materials and completed a two-day site visit on October 22-24, 2017. The site visit included meetings with the Provost and Vice-President (Academic), Deputy Provost, Dean of Engineering, the Chair of the Department, full-time, tenure-track faculty members, the technical staff, a group of undergraduate students, the Associate Vice-President, Research & Graduate Studies, the University Librarian and Liaison Librarian, and a group of alumni and community partners. The Review Team observed and/or toured laboratory facilities on the Thunder Bay campus, the Chancellor Paterson Library including the Teaching Commons and Northern Studies Research Centre (fifth floor).

In their report (February 2018), the Review Team provided feedback that describes how the programs delivered by the Department of Civil Engineering meet the Quality Assurance Framework evaluation criteria and align with the University mission, strategic plan and academic plan. The Review Team notes that the programs are of high quality

and offer students a regionally connected and learner-centred experience supported by the creative and scholarly contributions of the full-time faculty members and technologists.

At the undergraduate level, students must meet the standard University admission policies which are appropriate for the Program Learning Outcomes. Curriculum structure and delivery, and teaching and assessment methods are appropriate, are aligned with comparable programs across Canada at the undergraduate level, reflect the current state of the discipline, and are effective in preparing graduates to meet defined program outcomes and the University's Undergraduate Degree Level Expectations.

Strengths Summarized

The reviewers described the following key strengths:

- The Department is delivering a high quality educational experience in Civil Engineering.
- The faculty members are motivated to enhance the students' experience, the enthusiasm level is also high.
- The popularity of the post-diploma degree program is encouraging and provides college graduates an excellent pathway to the engineering profession.
- The Department gained an excellent reputation among college graduates across Canada. Some of the students met during the site-visit came from as far away as Vancouver area to pursue a Civil Engineering program at Lakehead.
- The governance of the academic affairs is also a strong key strength.
- The Department has established a process to monitor students' academic performances.

Opportunities

The Review Team identified several opportunities for improvement as part of their summary. Opportunities, unlike Recommendations, are not commented on as part of the FAR.

The reviewers suggest:
The reviewers wished to obtain data on the co-op program within the Department. Since a good percentage of the enrolment for the post-diploma stream, co-op placements improve the Department profile and help graduating students to find jobs.

Third year class sizes are deemed to be relatively large (100s), as most of the students are new to university life (post-diploma program students), and the absence of teaching

assistantship in the program, large class sizes might put too much pressure on the learners.

Recommendations

As per the IQAP, responses from the Department (in italics) and Dean of the Faculty of Engineering to each of the Review Team Recommendations are included below.

RECOMMENDATION 1: The Department should diversify the assessment tools. It appears from the table "Assessment Tools" that most of the assessment is done through course marks.

Department Response: *We agree with the external reviewers' recommendations as we have added students' performance in laboratory reports, course projects, quizzes and midterm examinations for the assessment last year. We will continue to diversify the "Assessment Tools".*

Engineering Decanal Response: *The Department has made significant progress to diversify assessment tools and to more appropriately measure the graduate attributes. I will work with the Department to further explore refinement of the assessment methods over time.*

RECOMMENDATION 2: The Department should involve the undergraduate program committee in the review of applications for the post-diploma stream as the process is based on case-by-case and puts an onerous workload on the Chair.

Department Response: *As noted by the reviewers, the admission for the post-diploma puts onerous workload on the Chair. The Faculty of Engineering is in the consultation phase of hiring a new administrative assistant who will work closely with the chairs in the post-diploma admission.*

Engineering Decanal Response: *I agree that additional support staff would be beneficial during certain times of the year. The Faculty has recently requested an Undergraduate Program Support Officer position to assist the chairs with routine tasks. Nevertheless, all engineering departments within the Faculty are supported by the Faculty of Engineering Academic Manager (Mrs. Moynihan) and the Administrative Officer (Femi Mirshekari). They are tasked with leading and coordinating admissions of post diploma students, student recruitment and retention activities, community outreach and promotion of engineering.*

RECOMMENDATION 3: The Department should develop a standard reporting process to monitor the implementation of the improvement strategies.

Department Response: *We agree with the reviewers' suggestion and will further develop a reporting process to monitor the improvement strategies.*

Engineering Decanal Response: *I agree that the effort was not sufficient to monitor the implementation of the improvement strategies. The Department has a standing Curriculum and Assessment Committee convened by the Chair. The Committee should meet regularly to review and assess curriculum and plans and to monitor and document progress toward successful achievement of their goals.*

RECOMMENDATION 4: The Department should form an Industry Advisory Committee to seek input for the improvement of the civil program.

Department Response: *There is a Faculty of Engineering advisory committee with civil engineers as members. We seek their feedback for the improvement of engineering education. The department is supportive to potential benefits of having a department advisory committee as suggested by the reviewers.*

Engineering Decanal Response: *The Faculty of Engineering has a standing Industry Advisory Board. The Board currently consists of the Dean, Assistant Dean, Program Chairs, and representatives from Ontario Power Generation, Bombardier, WSP Canada, TBT Engineering, TBayTel, and Resolute Forest Products. The Advisory Board is tasked with reviewing and assessing program objectives, identifying future industrial needs, and discussion of policies that impact the engineering profession. The Department is keen in establishing relationship with members of industry, and has received excellent support from local industry. The Department will continue to enhance the existing industrial engagement activities such as, sponsorship of the Steel Bridge Competition and partnership program with local employers.*

RECOMMENDATION 5: The Department should consider reducing the number of courses to bring the students' course load close to the average of similar programs offered in Ontario institutions.

Department Response: *The department reduced year 2 courses from 14 to 12. This modification will take effect in 2018/2019 for year 2 students. The reduction was achieved by combing the two soil courses in one new soil course and combing two courses in steel design and reinforced concrete design in a new steel and reinforced concrete design course. The core materials were kept in the new developed courses while materials that are taught in year 3 or year 4 courses were removed.*

Engineering Decanal Response: *The Department has indeed addressed this issue by implementing the actions described in the Departmental response. The Civil Engineering program must however include the minima for each of its components in order to meet the CEAB regulations. In conversation with Engineering Deans Canada, CEAB is currently considering a reduction in the total mandatory volume of curriculum content. Should this be ratified by CEAB, the course load in the program can be further reduced.*

RECOMMENDATION 6: The Department should introduce technical elective courses to cover new challenges in civil engineering practices including climate changes effects and sustainability of infrastructures.

Department Response: *We agree with the external reviewers' notion regarding the importance of climate change impacts and infrastructures sustainability for civil engineering graduates. The department has just filled two tenure-track positions and a limited term faculty position. This department will seek to create a final year engineering elective course in climate change and infrastructure sustainability based on the expertise of the new faculty members.*

Engineering Decanal Response: *The Department has addressed this issue by offering a number of new technical elective courses since the cyclical review. Among these courses are: Bridge Engineering, Prestressed Concrete Design, and Wind Engineering. Although these courses generally cover the elements of sustainability and infrastructures, they are not directly addressing the climate change.*

RECOMMENDATION 7: The Department should re-examine the curriculum scheduling and remove conflicting pre-requisite requirements.

Department Response: *The department periodically reviews and revises the pre-requisite requirements based on students' performance and feedback from faculty and students. The department had recently approved MATH 4030 Probability and Statistics as pre-requisite or co-requisite for ECIV 3738 Hydrology. This is implemented for 2018/2019 academic year. Also, ECIV 1230 Statics will be assigned as pre-requisite for ECIV 1630 Theory of Structures.*

Engineering Decanal Response: *The department seems to have this recommendation well under control by implementing changes described in their response in 2018-19. In addition, academic pathways have been developed and implemented in 2018-19 that enable further sequencing of classes in all programs across the campus and particularly post-diploma engineering programs. The pathways seem to be working and alleviated many of the frustrations the students experienced in terms of conflicting pre-requisite requirements in the past.*

RECOMMENDATION 8: The Department should work with the Faculty of Engineering to provide undergraduate students with study space and provide WIFI access to them.

Department Response: *Lakehead University is expanding the WIFI converge across the campus. There is WIFI coverage in the ATAC building and other buildings that house class room that are used by the department. There are plans to expand WIFI coverage to the Centennial Building, where the faculty members and the laboratory are located, in the very near future.*

Engineering Decanal Response: *Although WiFi access has grown significantly across the Campus since the last cyclical visit, the growth in Centennial Building was slow and limited compared to other campus buildings due to the postponed commencement of asbestos abetment in the Building. In terms of space, the University is overall challenged for space and the Faculty of Engineering as well. Civil Engineering students already have access to a variety of space resources throughout the University, including makerspace, student-focused learning spaces within the Library. In addition, the Lakehead Chapter of Canadian Society for Civil Engineering (CSCE) has assigned space that can be used for projects or study space. Students may utilize a variety of University rooms including computer labs in the ATAC building when available. Students may also gain access to labs for project work depending on availability and as long as health and safety issues are adequately addressed.*

RECOMMENDATION 9: The Department should reinforce the stakeholders' involvement in the review of the curriculum. Feedback from students, alumni and employers is necessary for the revision process.

Department Response: *We agree with the reviewers' suggestion. The curriculum committee will seek feedback from alumni and employers during the course revision process.*

Engineering Decanal Response: *The Faculty of Engineering Advisory Board has ordinarily met two times per year, typically following the end of the academic year, or as often as needed by the majority of board members. In the past meetings, the Board reviewed, assessed, and provided recommendations on curricula, and program development at the undergraduate and graduate levels. Professional (soft-skill) graduate attributes have particularly been the focus of the recent Board meetings. The individual departments have been in communication with external industrial company members. The Department of Civil Engineering has traditionally received support from the local industry to participate at the annual Senior Student Steel Bridge Competitions. To address concerns raised in this report and in the CEAB visiting team report, the Department has adopted a number of measures to enhance the engagement of students in the continual improvement of the program. These include the addition of graduate attribute content in new students' orientations and inclusion of relevant graduate attributes in course outlines. Chair, together with Lakehead CSCE student chapter, will hold an annual brainstorming session with the students in the Program to further engage students in the continual improvement process and collect feedbacks from them.*

RECOMMENDATION 10: The Department should seek other sources of funds to support its activities (i.e. industry, alumni support …).

Department Response: *This is a great idea to obtain extra funding for the department.*

Engineering Decanal Response: *Although most faculty members in the Department of Civil Engineering are active with research grants from the government or the industry, I*

agree that potential for improvement must be actively sought. The proposed PhD in Civil Engineering (under review) will help the faculty members of the Department to obtain more research funds from different entities should the program be approved.

RECOMMENDATION 11: The Department should review technical staffing needs.

Department Response: *The technical staff is an important element for an effective course materials delivery. We will periodically meet with the technical staff to review and discuss their needs.*

Engineering Decanal Response: *I concur with the department response.*

RECOMMENDATION 12: The Department should initiate teaching assistantship program to improve the undergraduate students' learning experience.

Department Response: *We agree with the reviewers' comments regarding the benefits of teaching assistantship to undergraduate students. After the start of the MSc in Civil Engineering in 2015 and the PhD program in 2021, more teaching assistants became available for our department. However, their role is primarily limited to grading of assignments and tutorials. As our graduate program expands with more students, graduate students will help undergraduate students during the tutorial sessions along with dedicated office hours for help to complete course projects and reports.*

Engineering Decanal Response: *The graduate MSc in Civil Engineering program has been expanded since the cyclical review and is expected to continue to grow. Increasingly more qualified graduate students from this program and other aligned graduate programs have been identified and employed as teaching assistants in a variety of undergraduate courses. The proposed PhD in Civil Program will definitely help respond to the demand for qualified teaching assistantship in the Department.*

Clarifications

The unit identified that no clarifications were necessary, based on the Review Team report.

Implementation Plan

Implementation Plan (Part A): Departmental Responsibilities

Recommendation	Proposed Follow-up	Responsibility*	Timeline
diversify the assessment tools	added students' performance in laboratory reports, course projects and midterm examinations for the assessment	Program Chairs	Initial Actions 2018-2019, Follow-up Ongoing
develop a standard reporting process to monitor the implementation of the improvement strategies	Department has a standing Curriculum and Assessment Committee convened by the Chair. The Committee should meet regularly to review and assess curriculum and plans and to monitor and document progress toward successful achievement of their goals.	Program Chairs	Initial Actions 2018-2019, Follow-up Ongoing
consider reducing the number of courses to bring the students' course load close to the average of similar programs offered in Ontario institutions	reduced year 2 courses from 14 to 12 *by combing the two soil courses in one new soil course and combing two courses in steel design and reinforced concrete design in a new steel and reinforced concrete design course*	Program Chairs	Initial Actions 2018-2019, Follow-up Ongoing
introduce technical elective courses to cover new challenges in civil engineering practices including climate changes effects and sustainability of infrastructures	*seek to create a final year engineering elective course in climate change and infrastructure sustainability based on the expertise of the new faculty members*	Program Chairs, Dean	2018-2019
re-examine the curriculum scheduling and remove conflicting pre-requisite requirements	*approved MATH 4030 Probability and Statistics as pre-requisite or co-requisite for ECIV 3738 Hydrology. This is implemented for 2018/2019 academic year. Also, ECIV 1230 Statics will be assigned as pre-requisite for ECIV 1630 Theory of Structures.*	Program Chairs	Initial Actions 2018-2019, Follow-up

			Ongoing
work with the Faculty of Engineering to provide undergraduate students with study space and provide WIFI access to them	*expanding the WIFI converge across the campus*	Program Chairs, Dean	2018-2020
reinforce the stakeholders' involvement in the review of the curriculum. Feedback from students, alumni and employers is necessary for the revision process	*seek feedback from alumni and employers during the course revision process*	Program Chairs, Dean	Initial Actions 2018-2019, Follow-up Ongoing
seek other sources of funds to support its activities (i.e. industry, alumni support …)	*active with research grants from the government or the industry*	Program Chairs, Dean	ongoing
review technical staffing needs	*periodically meet with the technical staff to review and discuss their needs*	Program Chairs, Dean	ongoing
initiate teaching assistantship program to improve the undergraduate students' learning experience	*graduate students will help undergraduate students during the tutorial sessions along with dedicated office hours for help to complete course projects and reports*	Program Chairs, Dean	2018-present

Implementation Plan (Part B): Decanal & Administration Responsibilities

Recommendation	Proposed Follow-up	Responsibility*	Timeline
Involve the undergraduate program committee in the review of applications for the post-diploma stream as the process is based on case-by-case and puts an	The Faculty has recently requested an Undergraduate Program Support Officer position to assist the chairs with routine tasks. Nevertheless, all engineering departments within the Faculty are supported by the Faculty of Engineering Academic Manager (Mrs. Moynihan) and the Administrative Officer (Dr. Landry). They are tasked with	Dean	2019-2020

onerous workload on the Chair	leading and coordinating admissions of post diploma students, student recruitment and retention activities, community outreach and promotion of engineering.		
form an Industry Advisory Committee to seek input for the improvement of the civil program	*Faculty of Engineering advisory committee with civil engineers as members*	Dean	Initial Actions 2018-2019, Follow-up Ongoing

*The Dean of the Faculty, in consultation with the Department Chair shall be responsible for monitoring the Implementation Plan. The details of progress made will be presented in the Deans' Annual Reports and filed in the Office of the Provost and Vice-President (Academic).