



## Civil and Environmental Engineering Final Assessment Report & Implementation Plan

<b>Faculty / Affiliated University College</b>	Faculty of Engineering
<b>Degrees Offered</b>	BESc Civil /Environmental Engineering
<b>Modules Reviewed</b>	Civil and Structural Engineering; Environmental Engineering; Civil Engineering and Management; Civil Engineering and Law; Structural Engineering and International Development; Environmental Engineering and International Development
<b>External Consultants</b>	Professor Brent Sleep, Chair, Department of Civil and Mineral Engineering, University of Toronto  Professor Yi Liu, Head, Department of Civil and Resource Engineering, Dalhousie University
<b>Internal Reviewer</b>	Tracy Isaacs, Associate Dean (Academic), Arts and Humanities
<b>Date of Site Visit</b>	November 26, 2018
<b>Evaluation</b>	<b>Good Quality</b>
<b>Approval Dates</b>	SUPR-U: March 20, 2019 SCAPA: April 3, 2019 Senate: April 12, 2019
<b>Year of Next Review</b>	2026-27

In accordance with Western’s Institutional Quality Assurance Process (IQAP), the Final Assessment Report provides a summary of the cyclical review, internal responses and assessment and evaluation of the undergraduate modules delivered by the Department of Civil and Environmental Engineering. This report considers the following documents: the program’s self-study, the external consultants’ report and the responses from the Department and Faculty. The Final Assessment Report identifies the strengths of the program, opportunities for program enhancement and improvement and details and prioritizes the recommendations of the external consultants and prioritizes those recommendations that are selected for implementation.

The Implementation Plan details the recommendations from the Final Assessment Report that are selected for implementation, identifies who is responsible for approving and acting on the recommendations, any action or follow-up that is required and the timeline for completion.

The Final Assessment Report and Implementation Plan is sent for approval through SUPR-U, SCAPA, Senate and the Ontario Universities’ Council on Quality Assurance and is made available on a publicly accessible location on Western’s IQAP website. The Final Assessment Report and Implementation Plan is the only document resulting from the undergraduate cyclical

review process that is made public, all other documents are confidential to the Program/School/Faculty and SUPR-U.

### **Executive Summary**

The site visit took place on November 26, 2018, the same day as all the other site visits for all Engineering programs and coinciding with the Canadian Engineering Accreditation Board (CEAB) site visit. Much of the provided documentation was also the same as what was provided to the CEAB team. As the external reviewers note, this was expedient and understandable, but since the CEAB and the IQAP review have different objectives and purposes, it wasn't ideal from the IQAP perspective. It was sometimes challenging to find simple information needed to speak to IQAP criteria.

The site visit itinerary included meetings with the following:

- Vice Provost (Academic Programs)
- Vice Provost (Academic Planning, Policy and Faculty)
- Department Chair and Undergraduate Chair
- Acting Dean and Associate Dean (undergraduate studies)
- Members of the Undergraduate Curriculum Committee
- Faculty members
- Librarians and library tour
- Department Administrative Staff
- Department Technical Staff
- Facilities tour
- Students

The external reviewers' report paints a picture of a well-resourced department with a strong faculty complement, sufficient admin staff and technical staff support, excellent library resources, sufficient IT resources, and curriculum that appropriately reflects the current state of the civil engineering discipline within the specialization of the areas of structural engineering, environmental engineering, and international development. Of the 80-90 students per year, the majority are in the Structural Engineering program. The report notes enthusiastic support for the fourth-year capstone course (a CEL course offered in collaboration with the City of London). Instructors and students alike also spoke highly of the International Development programs. Reviewers point out a consistent expression of concern about the proposed cuts to TA support and the impact these may have on undergraduate courses. The reviewers also report that the Program's requirements are appropriate and consistent with the Western Degree Outcomes, which the Department self-study showed to map onto the CEAB Graduate Attributes.

### **Significant Strengths of the Program**

The following program strengths are identified in both the self-study and the External Consultants' Report

- High quality program with excellent faculty and staff
- Students express satisfaction with the Program and options within the Program. Students indicated that the learning experience exceeded their expectations in terms of the quality of the curriculum, opportunities for personal and professional development and the support they received from the Department.

- Fourth Year Capstone Course offered in collaboration with the City of London has been very successful in providing students with experiential learning in practical design projects mentored by professionals in industry.
- Structural and Environmental Engineering and International Development programs, which are unique in Canadian civil engineering programs
- Promotion of interdisciplinary initiatives, e.g. students in the International Development programs take courses in Geography and the Centre for Global Studies; students have an option to take a combined degree with Business or with Law.
- Opportunities for overseas internships for students
- Percentage of female students (27%) slightly higher than the national average for civil engineering (as reported in 2016 at 25%), and the women report a positive student experience in the program.

### **Summary of the Reviewers' Key Recommendations and Department/Faculty Responses**

Reviewers made the following recommendations:

1. Continued effort will be required to increase enrolment in the environmental option. Introduction of environmental engineering into first year would help recruit students into the environmental engineering option.
2. Concern over reduction in TA support needs to be addressed.
3. Low representation of female faculty members in the Department. A total of three female faculty members, with none in the structural engineering area. Increasing the number of female faculty members will require a continued commitment from Department and Faculty.

Department's response:

1. The department exerts some effort to promote its Environmental Engineering program through outreach to first year students and high school students, and the first year students have exposure in several lectures in 1050. There has been some increase in recent years, and if the 2+2 programs succeed, those international students will be able to join the environmental option in third and fourth year.
2. The TA reduction has been a point of discussion and concern for 2 years. The Department held a half day retreat to address teaching practices that may help deal with the reduction. Discussions to minimize the impact of the TA reduction will continue.
3. The representation of women faculty members in the Department was not addressed in the Departmental or Faculty response.

### **Other Opportunities for Program Improvement and Enhancement**

Reviewers identify the following issues:

1. Students might benefit from more departmental-level advising (at present it is largely done at the Faculty level)
2. Proposed 2+2 requires buy-in from faculty members and more detailed study before it can be considered a viable initiative.

3. Students should be provided learning opportunities in the areas of machine learning and artificial intelligence, as well as climate change, since these are emerging popular areas of interest in the field.
4. Increase the visibility of wind engineering and urban sustainability in the curriculum in all options to better utilize the strengths of faculty members in this area as they are not currently covered in any substantive way.

The Departmental Responses are as follows:

1. The Department has two faculty advisors: one for 1<sup>st</sup> and 2<sup>nd</sup> year students and one for 3<sup>rd</sup> and 4<sup>th</sup> year students.
2. 2+2 was not directly addressed in the departmental response.
3. The Department recently hired a faculty member with expertise in climate change. Current curriculum includes an introduction to the theory of optimization, taught in a second year course. The department will consider extending this to include machine learning and AI.
4. The Department has introduced a course on urban sustainability taught by the Western Research Chair that has recently joined the Department.

The Department also explained the reasons for needing to cap the International Development Programs' enrolment at 20 (limited scholarships to support international travel for the students). The Department noted that in terms of Health and Safety in workplaces abroad, students in this program complete a training module called "Foundations for International Mobility and Engagement." The Department's response also addressed the point that Sustainability is a new addition to the curriculum, in a course entitled: "Cities: Resilience and Sustainability."

The Faculty of Engineering response states that the Faculty is satisfied with both the report of the external reviewers and the Departmental response.

## Implementation Plan

The Implementation Plan provides a summary of the recommendations that require action and/or follow-up. The Department Chair/Director, in consultation with the Dean of the Faculty/Affiliated University College Principal will be responsible for monitoring the Implementation Plan. The details of progress made will be presented in the Deans' Annual Report and filed in the Office of the Vice-Provost (Academic).

<b>Recommendation</b>	<b>Proposed Action and Follow-up</b>
1. Sustained effort to recruit into Environmental Engineering program	Department to continue recruitment/outreach plan and also possibly target 3 <sup>rd</sup> and 4 <sup>th</sup> year international students in 2+2
2. Address impact and plan for managing TA reduction	Concrete plan required; ongoing discussion with colleagues