Western UNIVERSITY · CANADA

Civil and Environmental Engineering

Final Assessment Report &
Implementation Plan
September 2022

Faculty / Affiliated University College	Engineering	
Degrees Offered	MEng, MESc, PhD	
Date of Last Review	2013-2014	
Approved Fields	Environmental and Water Resources Engineering Geotechnical and Geoenvironmental Engineering Structural and Infrastructure Engineering Wind Engineering and Environmental Fluid Mechanics	
External Reviewers	Dr. Kent Novakowski Department of Civil Engineering Queen's University	Dr. Ghyslaine McClure Department of Civil Engineering McGill University
Internal Reviewers	Dr. Peter Donahue Grad Chair, Social Work School of Social Work	Brianna Rector Ph.D. Candidate Department of Chemistry
Date of Site Visit	March 22 - 23, 2022	
Date Review Report Received	April 27, 2022	
Date Program/Faculty Response Received	Program – August 25, 2022 Faculty – August 29, 2022	
Evaluation	Good Quality	
Approval Dates	SUPR-G: November 28, 2022 ACA: January 11, 2023 Senate (for information only): January 20, 2023	
Next Review	Year of next cyclical review: 2029-2030	
Progress Report	June 2025	

Overview of Western's Cyclical Review Assessment Reporting Process

In accordance with Western's Institutional Quality Assurance Process (IQAP), the Final Assessment Report (FAR) provides a summary of the cyclical review, internal responses, and assessment and evaluation of the Civil and Environmental Engineering Graduate Program delivered by the Faculty of Engineering.

This FAR considers the following documents:
- the program's self-study brief;
- the external reviewers' report;
- the response from the Engineering Program; and
- the response from the Dean, Faculty of Engineering.

This FAR identifies the strengths of the program and opportunities for program enhancement and improvement and details the recommendations of the external reviewers – noting those recommendations to be prioritized for implementation.

The Implementation Plan details the recommendations from the FAR that have been selected for implementation, identifies who is responsible for approving and acting on the recommendations, specifies any action or follow-up that is required, and defines the timeline for completion.

The FAR (including Implementation Plan) is sent for approval through the Senate Graduate Program Review Committee (SUPR-G) and ACA, then for information to Senate and to the Ontario Universities' Council on Quality Assurance. Subsequently, it is publicly accessible on Western's IQAP website. The FAR is the only document from the graduate cyclical review process that is made public; all other documents are confidential to the Department of Civil and Environmental Engineering, Faculty of Engineering, the School of Graduate & Postdoctoral Studies (SGPS), and SUPR-G.

Executive Summary

Western has been offering graduate programs in Engineering Science since 1961. Accredited by the Ontario Council of Graduate Studies, the three graduate degree programs offered in the Department of Civil and Environmental Engineering are:

- **MEng**: Offering both a course-based curriculum option and a project-based curriculum option. The Course-based program option requires a student to take 10 courses (5.0 Credits). The project-based curriculum option requires students to take 8 courses (4.0 Credits) and a MEng research project as a program milestone. Continuous part-time enrolment is equally offered. In 2019-20, there were a total of 157 enrolled students.
- **MESc**: A full-time research-based degree, students must complete four Graduate courses (2.0 Total Credits), complete one seminar session over the course of the degree, successful defense, and submission of a research thesis. In 2019-20, there were 75 enrolled students.
- **PhD**: A full-time research-based degree, students must pass a Comprehensive Examination covering basic knowledge in the student's selected field and examining aptitude for independent research to be formally admitted as PhD candidates. In 2019-20, there were 111 enrolled students.

To inform the self-study for this program review, regular departmental council meetings and dedicated annual retreats featured discussions about topics such as curriculum development, recruitment strategies, and ways of enhancing the student learning experience. In addition, a graduate student survey administered in winter 2021 solicited the student perspective on topics such as facilities and resources, supervision, courses, program and financial support. 111 responses were received, accounting for about 45% of students in the program.

The external reviewers shared a positive assessment of the Civil and Environmental Engineering Graduate Program. They offer three specific recommendations and a host of suggestions and items for consideration.

Strengths and Innovative Features Identified by the Program

- State-of-the-art facilities provide graduate students in different research areas a great opportunity to push the boundaries of science and knowledge, and offer unique training environments.
- Valuable internship opportunities for students, for example via the NSERC Industrial Postgraduate (IPS) program (until 2015), and the MITACS Accelerate program (since 2015).
- Wind Engineering courses not available at any other universities globally.
- The Civil seminar series organized by the CEE department which involves weekly seminars taking place during the fall and winter terms. This is a required milestone for all graduate students.

- A milestone in the PhD program – the Research Communication Module – aiming to help students clearly articulate their research plan from a critical perspective both orally and in writing and communicate research to various types of audiences.
- Graduate Diploma (GDip) in Engineering Leadership and Innovation, which can be combined with the Master of Engineering (MEng).
- PhD Dual-Degree agreements with several International Universities

Concerns and Areas of Improvement Identified and Discussed by the Program

- Reduction of completion times of both PhD and MESc.
- Comments shared by students include:
    - limited number of courses available for the MEng students,
    - limited course access to appropriate IT resources,
    - limited financial support for MESc and PhD students,
    - lack of scholarship opportunities for international students, and
    - MESc and PhD students feel less informed about information on career-related issues and professional development, and departmental student social activities.

Review Process

As part of the external review, the review committee, comprising two external reviewers, one internal reviewer and a graduate student reviewer, were provided with Volume I and II of the self-study brief in advance of the scheduled review and then met virtually (due to pandemic restrictions) over two days with the:

- Vice-Provost of the School of Graduate & Postdoctoral Studies
- Associate Vice-Provost of the School of Graduate & Postdoctoral Studies
- Vice-Provost, Academic Planning, Policy and Faculty
- Director, Academic Quality & Enhancement
- Dean, Western Engineering
- Associate Dean, Western Engineering
- Department Chair
- Graduate Program Chair
- Graduate Committee Members
- Associate University Librarian
- Graduate Program and Departmental Staff
- Program Faculty Members
- Graduate Students

Following the virtual site visit, the external reviewers submitted a comprehensive report of their findings which was sent to the Program and Dean for review and response. Formative documents, including Volumes I and II of the Self-Study, the External Report,

and the Program and Decanal responses form the basis of this Final Assessment Report (FAR) of the Civil and Environmental Engineering Graduate Program. The FAR is collated and submitted to the SGPS and to SUPR-G by the Internal Reviewer with the support of the Office of Academic Quality and Enhancement.

Summative Assessment – External Reviewers' Report

External reviewers shared that "*the top ranking of CEE […] and its strong ranking on the international scene leave no doubt on the research competence of the faculty, in combination with its exceptional laboratory infrastructure that enrich teaching."*

Strengths of the Program

- Graduate students expressed a very high degree of satisfaction in terms of quality of teaching and development opportunities provided by CEE, the Faculty of Engineering and Western as a whole.
- The CCE research program curriculum is quite diverse in terms of number of courses offered and areas of expertise.
- Graduate curriculum is enriched by faculty member's research. The reputed Boundary-Layer Wind Tunnel facilities, the WINDEEE Dome, and the Geotechnical Centrifuge Laboratory, are unique to Western and unmatched in other civil engineering departments in Canada.
- The Department has the human, physical and financial resources it needs to maintain its program excellence and upcoming enhancements.

Areas of Concern or Prospective Improvement

1. Students' concerns regarding feedback and mentoring from their supervisor could be addressed by clearer parameters and good practices for research supervision and mentoring.
2. PEng status is only held by 65% of faculty members which impacts students' ability to get the required letters of recommendation they need in obtaining professional accreditation.
3. The following issues were observed with program admission:
    - Some international students expressed concerns that their excellent academic standing at their reputed home institutions was not adequately reflected in the "grade equivalency formula" used by Admissions.
    - The department should develop a recruitment plan to specifically target alumni of high-profile international institutions.
    - The minimum English Language Proficiency Requirements for MEng students should be reviewed as some students struggle with English language, which could be an obstacle to their entry into the industry after graduation.

4. The department has no guidelines for the recognition of prior work or learning experience of both domestic and international students.
5. The number of international students in CEE has grown significantly over time, yet there appears to be no strategy expressed for doing so, no determination of market need (particularly for the MEng students), and no evaluation of professional outcomes for the non-research students.
6. Research students should be provided more opportunities to present their work in technical conferences; travel advances, along with supervisor support, are good mechanisms to enhance students' conference participation.
7. The CEE has particularly low graduate enrollment of female students in comparison with the Canadian average.

Summary of the Reviewers' Recommendations and Program/Faculty Responses

The following are the reviewers' recommendations in the order listed by the external reviewers. Recommendations requiring implementation have been marked with an asterisk (*).

Reviewers' Recommendation	Program/Faculty Response
1. Urgently increase the number of women in the tenured and tenure-track academic staff complement.	**Program:** The program is aware that the percentage of female faculty members is below the Canadian average for Civil engineering Departments and is making progress to address this via the recent hire of two female faculty members: • In the Wind Engineering field, a new female faculty member (Dr. Jin Wang) joined the Department on July 1st, 2022, as an Assistant Professor (tenure track). • A female candidate has recently accepted the offer for Canada Research Chair (CRC) Tier II in the field of resilience and sustainability and currently submitting her CRC application. It is expected that she will join the department in July 2023. In addition, the Department is currently recruiting a high-profile female full professor for Western Research Chair in Climate Change. The Department received an approval from the University to proceed with her interview without advertising. The interview will be held September 2022, with an expected start date of July 2023. The department is also advertising for two more faculty positions in Material Engineering and Intelligent Transportation. The Department Chair has approached excellent female candidates and there is a high chance that these two positions may be filled by females. Even without these two positions, the Department is set to exceed the Canadian average of female academics in Civil Engineering Departments following the recent hires. **Faculty:** The Faculty is fully supportive and has prioritized efforts to increase the female faculty complement within the Department of Civil and Environmental Engineering. As the Faculty of Engineering is going through an expansion, the Faculty leadership is actively engaged in seeking female applicants to further increase the number of female faculty members using this opportunity.

2. Implement effective streams of student-staff-leadership communications to address research student issues related namely to mentoring and funding. *	**Program:** The Department currently has mechanisms in place to facilitate regular communication between research students and the Departmental leadership. This is currently done through two main approaches: • Graduate student representation on the CEE Graduate committee. • For specific supervision/mentoring issues, a student has the option to call for a private meeting with the Graduate Chair to freely discuss their concerns, seek advice, or ask the Graduate Chair to be involved to solve supervisor/student conflicts. In addition to the existing channels above, the Associate Chair (Graduate) will begin holding regular meetings/town hall sessions with research students to further address any concerns they might have. These meetings will be similar to the weekly session held by the Associate Chair (Graduate Professional programs) for MEng students but are expected to be held 1-2 times per term. Regarding issues raised about funding, the Faculty Graduate Committee has begun to address this issue by revising the funding model to gradually redistribute the Graduate Teaching Assistants (GTA) income, which previously was included as part of the funding package, to have it as top-up funding. This change has been made gradually over the past two years where currently 2/3 of the GTA income is considered as a top-up for the research student while 1/3 is still considered as part of the funding package. This was a good initiative to provide further financial support to research students holding GTA positions; however, the program recognizes that this increase is not sufficient. During a recent departmental retreat, a motion was carried to increase the minimum funding for research students (International/ Domestic PhD, and Domestic MESc). Effective September 2022, the minimum funding will be $1300/month instead of $1083/month, plus tuition fees and 100% of the Graduate Teaching Assistantship (GTA) income is now considered as a top-up to this monthly stipend. This will increase the annual funding by approximately $4,600/student. **Faculty:** The Faculty Graduate Office will fully support the development and implementation of effective communication streams not only in CEE but other departments within the Faculty as well.

3. Clearly define the roles and responsibilities of research supervisees and supervisors in a binding document that will present realistic expectations with respect to the supervision process. *	**Program:** Currently, a one-hour Civil seminar session is held in the first week of fall/winter terms during which the Associate Chair, Graduate makes a presentation to all research students explaining the roles, responsibilities, expectations, and rights of the supervisor and the research supervisees. This presentation follows the main guidelines provided in the Graduate Supervision Handbook which is also available on the SGPS website. An abridged version of this presentation is made annually to all CEE Faculty members during one of the Department Council meetings or the retreat to remind them of their rights and responsibilities as supervisors, and the rights of students. The Department's mentorship committee, which consists of senior CEE faculty from the four different research fields, has orientation sessions explaining the supervision process to junior faculty/new hires **Faculty:** The Faculty Graduate Office is in the process of developing a faculty-wide framework for the effective communication of roles, responsibilities and expectations, as well as a support mechanism for both the students and supervisors, to address any challenges they face with regards to the supervision process. The Faculty Graduate Office will work with the CEE and other Engineering departments to develop and implement this framework.

Implementation Plan

The Implementation Plan provides a summary of the recommendations that require action and/or follow-up. In each case, the Graduate Program Chair, in consultation with the SGPS and the Dean of the Faculty of Engineering is responsible for enacting and monitoring the actions noted in Implementation Plan.

Recommendation	Proposed Action and Follow-up	Responsibility	Timeline
Recommendation #1 Develop an actionable and comprehensive approach to enhancing gender equity within the CEE Program in alignment with Western's commitment to EDIAD.	Department and Graduate Program, in collaboration with Dean's Office, to develop a strategic plan aimed at enhancing gender equity within CEE. Begin to execute initiatives identified as priorities through the gender equity strategic planning. Ensure graduate student participation in this initiative.	Associate Dean Graduate Associate Chair Graduate Dean Department Chair	By September 2023
Recommendation #2: Implement effective streams of student-staff-leadership communications to address research student issues.	Hold regular meetings/town hall sessions 1-2 times per term with research students to address any concerns they might have. Maintain graduate student representation on CEE Graduate Committee. Consider adding student feedback as a standing item on the meeting agenda that the student member could regularly speak to.	Associate Chair (Graduate)	By April 2023

Recommendation #3: Clearly define the roles and responsibilities of research supervisees and supervisors in a document that will present realistic expectations with respect to the supervision process.	Complete the development of a faculty-wide framework: 1) to enhance the effective communication of roles, responsibilities and expectations; 2) to implement a support mechanism for both the students and supervisors; and 3) to address any challenges faced with regards to the supervision process.	Associate Chair (Graduate) CEE Mentorship committee Faculty Graduate Office	By September 2023

Other Opportunities for Program Improvement and Enhancement

1. From a legal, immigration perspective, the issue of a 3-semester program leading to the issuance of a 1-year only work permit was brought to the attention of the reviewers. They recommend that prospective international students be clearly informed of this situation before they make a commitment to accept admission.
2. The Department should consider a sign-off procedure for training on all equipment having safety risk. A Department Safety Committee with graduate student representation would also help with due diligence in this area. Leadership for this Committee should be provided by a faculty member.
3. Considering that many high-profile professors in the Department are nearing retirement, there appears to be a need for a detailed Succession Plan that would inform hiring of new academics and ensure the sustainability of experimental research activities in the various laboratories.
4. There appears to be an opportunity to increase gender equity and improve role-model visibility for women on the department's executive team.
5. With respect to the MEng Program, the reviewers recommend 1) the development of a long-term strategy for the MEng program, with data supporting the need, clear program objectives, and metrics for success, and 2) longitudinal tracking of program alumni.
6. A clear admission path for MESc students to successfully enroll into the PhD program may be helpful, as this may yield significant financial and research advantages for the program.