

**Joint Graduate Programs in Environmental Engineering with the University of Ottawa
Update on Unit Response to External Reviewers' Report & Action Plan
Programs Being Reviewed: MASc, MEng and PhD in Environmental Engineering
Completed by: Paul Van Geel, Associate Director, OCIENE**

**Approved by Associate Dean: Richard Dansereau, Associate Dean (Graduate Studies and Postdoctoral Affairs), Faculty of Engineering and Design
November 20, 2023**

Note: This document is made available for public posting on the Vice- Provost's website.

***** Denotes items that SQAPC would like the unit to pay particular attention to based on their past review of the original action item.**

External Reviewer Recommendation	Original Action Item	Owner & Timeline	Progress Update August 2023	Have calendar changes been initiated or completed (Not applicable/Yes/No), if Yes, when
1. Define a roadmap for each program, make the information readily available to students and optimize the progress tracking. (Weakness)	<p><i>While the Institute defines the program requirements, the sister universities provide students with a roadmap via an annual orientation session and each university has its own student tracking system.</i></p> <p><i>The University of Ottawa provides a tailored roadmap to every OCIENE graduate student (MEng, MASc and PhD students) in the form of a list of milestones related to the student's degree. These milestones are accessible to the students via the online Student Center website. The status of the milestones is updated on the website in real-time so that the students can evaluate their progress in their degree.</i></p>	<p><i>Institute Director and Associate Director at the respective universities</i></p>	<p><i>University of Ottawa and Carleton University have both implemented an OCIENE-specific orientation session starting Fall 2022. Carleton University has implemented an OCIENE Graduate Student Handbook for Fall 2023 (attached).</i></p>	<p><i>Not applicable</i></p>

In addition, the Graduate Studies Office of the Faculty of Engineering sends regular emails to graduate students in the program reminding them of milestones and upcoming deadlines for upcoming milestones. For example, email reminders with specific directions on how to register for and complete milestones are sent to all OCIENE graduate students for the completion of their Thesis Proposal and Comprehensive Exam (EVG 9998).

In light of this identified weakness, the University of Ottawa will enhance communication to the OCIENE graduate students to enhance the use of the online Student Center website. In particular, a tailored orientation for OCIENE graduate students of the University of Ottawa will be created and provided to the graduate students every year starting Fall 2022. This presentation will occur following the general orientation presentation provided by the Graduate Studies Office of the Faculty of Engineering. This new presentation will emphasize the precise use of the Student Center website for students for OCIENE MEng, MASc and PhD students, so that they immediately become engaged with the system. The proposed solution is founded on the successes observed by two other graduate programs in the Faculty of Engineering who recently created tailored orientation presentations for their graduate students.

	<p><i>Carleton provides various in-person and on-line resources that provide guidance to students in terms of program requirements, milestones (graduate student audits), etc. However, this material is located in different locations. To improve the current situation and address the reviewers' recommendation, Carleton will introduce an OCIENE student handbook to bring all the relevant information together, to better define a roadmap for each program and to provide clear guidelines for tracking student progress. In addition, an OCIENE-specific orientation session will be introduced this Fall 2022.</i></p>			
<p>2. Articulate the MEng program as a separate professional program to minimize the impact of the MEng growth on access to courses to MASc and PhD candidates and on the content/format of the courses to accommodate heterogeneity of the group of students. (Concern)</p>	<p><i>Both universities are in the progress of addressing this concern.</i></p> <p><i>The University of Ottawa has recently introduced general engineering courses (GNG coded courses) tailored for MEng graduate students in all Faculty of Engineering programs. MEng OCIENE graduate students are required to take a minimum of 20% of their course load (2 out of 10 course equivalents) and a maximum of 60% of their course load (6 out of 10 course equivalents) from GNG courses. These GNG courses include an MEng mandatory 3 credit course (one course equivalent) on professional skills and responsibilities. Optional MEng GNG courses include a 6 credit course (2 course equivalent) that is an industrial Internship project, which is organized by the faculty.</i></p>	<p><i>Action already initiated by the Vice-Dean, Graduate Studies at uOttawa and the Dean of FED at Carleton.</i></p>	<p><i>The University of Ottawa already implemented general engineering courses tailored to MEng graduate students. Carleton University has introduced an MEng Engineering Practice program that is not included in the OCIENE. There is a specific stream of Environmental Engineering; Master of Engineering, Engineering Practice (Environmental Engineering).</i></p>	<p><i>Yes</i></p> <p><i>Calendar at University of Ottawa was updated 2021-2022.</i></p> <p><i>Calendar at Carleton University was update 2023-2024.</i></p>

The GNG courses have reduced the number of MEng graduate students attending OCIENE specific courses. In particular, the addition of the GNG courses has reduced the MEng student attendance of specified and advanced OCIENE courses that MAsC and PhD students require for their research. Hence, enabling the content of these specified courses to remain tailored to graduate students performing thesis-based degrees (MAsC and PhD).

Introducing GNG courses in the OCIENE program at the University of Ottawa has alleviated the burden of MEng graduate students restricting access and impacting the content/format of graduate courses in the program. It is noted that the graduate program benefits from maintaining MEng students in the program. For example, numerous OCIENE MEng students are excellent students and a portion of this cohort have transitioned to thesis-based degrees in the program. As such, keeping the MEng degree in the OCIENE program at the University of Ottawa has provided an important pathway of recruitment of quality students into the MAsC and PhD degrees. Thus, MEng degree will be kept in the OCIENE program at the University of Ottawa.

Carleton has proposed a MEng Engineering Practice program that will introduce a separate MEng program

	<p><i>outside of the Institute. This will lead to fewer MEng students within the Institute and reduce the demand of MEng students on the graduate course offerings in the department. The Department of Civil and Environmental Engineering at Carleton will teach a number of Civil and Environmental Engineering courses in the proposed MEng Engineering Practice program, which would allow maintaining ties to potentially recruit research students from the program. Those students will then be transferred to the Environmental Engineering program within the institute.</i></p>			
<p>3. Evaluate and manage the impact on space of the growth in the number of MEng, PhD and Faculty, especially in the context of return on campus after a significant growth during the pandemic. (Concern)</p>	<p><i>The Space Committees of each department and the Faculty of Engineering at the University of Ottawa oversee space allocation for research and graduate students. This committee ensures that all new OCIENE professors receive the space required for their research and also that all incoming OCIENE thesis-based graduate students receive office space. The allocated office space is often coordinated so that it is in close proximity to the student's research space.</i></p> <p><i>This is observed in the recent OCIENE professor hires. The University of Ottawa has hired four new OCIENE professors in the years just prior to the pandemic. These professors have been allocated laboratory space and office space for graduate students. Further, existing</i></p>	<p><i>Vice-Dean, Graduate Studies, and Dept Chair at uOttawa and the Dean of FED and Dept Chair at Carleton.</i></p>	<p><i>Carleton University opened the Student Design Centre this past year which included additional space for faculty member offices, research space and general student space. The Faculty of Engineering and Design continues to work with the Department of Civil and Environmental Engineering to identify and improve space for thesis/research-based students. As noted in the Original Action Item, MEng students are not assigned an office but have access to study space across the campus and will have access to space in the new proposed engineering building.</i></p>	<p><i>Not applicable</i></p>

laboratory space has been renovated for the new hires to set up their research.

In addition, a state-of-the-art water resources laboratory was built in 2019 in the new Science, Technology, Engineering and Mathematics (STEM) building at the University of Ottawa. This facility is currently available to accommodate current and future OCIENE professors and graduate students. Further, a new microbiological environmental engineering laboratory was built in 2021 in the existing Colonel By Hall (CBY) engineering building at the University of Ottawa. This new laboratory is also available to accommodate current and future OCIENE professors and graduate students. Furthermore, a new Materials Laboratory has been created. This laboratory is available to recently hired OCIENE faculty (Drs. Foruzanmehr and Kavgic) and future OCIENE faculty conducting materials research.

At Carleton, we recognize that research space is a considerable constraint, although it has been relatively less of a constraint in the Environmental Engineering program relative to others within the Faculty of Engineering and Design or the Department of Civil and Environmental Engineering. To address these concerns, a new building will open this year with additional faculty offices and plans are progressing for a new building with new offices and additional laboratory research space within the next

	<p><i>5 years. Note MEng students are not assigned an office but have access to study space across the campus and in the new proposed buildings.</i></p>			
<p>4. Seize the opportunity to redefine and organize the areas in order to offer a unique training program including sustainability and climate change. (Opportunity)</p>	<p><i>Both universities will continue to increase course offerings under the newly named 5th breadth area – EIA, Sustainability and Climate Change and increase the opportunity for training in sustainability and climate change. For example a new course from the University of Ottawa is being created for the Winter 2023 semester, where this course will be considered for addition to this breadth area. The new course is titled Renewable Energy and Resource Conservation.</i></p> <p><i>Carleton recently introduced a Collaborative Specialization in Climate Change (CSCC), which Master’s students in Environmental Engineering can complete as part of their program requirements.</i></p>	<p><i>Institute Director, Associate Director and Dept Chairs at the respective universities</i></p>	<p><i>OCICE has expanded course offerings in the fifth breadth area - EIA, Sustainability and Climate Change. ENVE 5206 Energy and Resource Recovery and (Carleton) and EVG Climate Change Impacts on Water Resources (Ottawa) have already been added to the calendar.</i></p> <p><i>Courses have been introduced as special topics courses. Once they have been offered twice, they typically are brought forward as a new course. ENVE 5701 Resilient Infrastructure and Sustainable Urban Future, ENVE 5702 Energy Development in the Critical Zone and ENVE 5107 Radiative Transfer and Remote Sensing (Carleton); the latter two courses have been approved as new courses by OCIENE at it June AGM and both will be in the fifth breath area.</i></p>	<p><i>Yes</i></p> <p><i>Carleton’s 2023-2024 calendar and two courses to be added for 2024-2025 calendar.</i></p> <p><i>University of Ottawa’s calendar also includes these courses.</i></p>

Joint Graduate Programs in Environmental Engineering
Update on Learning Outcomes Assessment Activities
Programs Being Reviewed: MAsc, MEng and PhD Environmental Engineering
Completed by: Paul Van Geel, Associate Director OCIENE

1. Who is responsible for the assessment of program learning outcomes?

- Learning Outcomes Assessment Committee
- Undergraduate/Graduate and/or Curriculum Committee(s)
- All faculty in unit
- Other:

2. Which program learning outcomes have been assessed since your last CPR? If no assessment activities were undertaken, please provide a rationale and describe what is required in order for assessment to take place moving forward.

Every year (continuously) we assess the extent to which learning outcomes are met by each thesis proposal defence and thesis defence. This is achieved using faculty-completed forms.

To assess how program-level learning outcomes are taught and assessed at the course-level, each course instructor completes a survey detailing which learning outcomes are taught and assessed in their course and what methods are used to assess them. This process is completed for all courses every three years. The last assessment was done in 2021-2022.

The learning outcomes assessment committee presents a yearly report to the Board of Management with their findings and recommendations.

3. Did you follow your assessment plan? If not, how did your assessment plan change and why?

Yes

4. What methods have been used to assess the program level learning outcomes? (check all that apply)

- Reviews of examples of student work
- cuPortfolio
- Student surveys or focus groups
- Faculty retreats or discussion sessions
- Reviews of program curricula and courses (*includes efforts to align course and program learning outcomes*)
- Other _faculty complete LO form after each thesis proposal defence and thesis defence

Provide additional details if necessary:

5. What assessment activities are planned between now and your next CPR? Provide specific LOs and timeframes.

We will continue to monitor all learning outcomes continuously with faculty-completed forms for each proposal defense and thesis defense. Our next survey of learning outcomes at the course level will be completed in 2024-2025