

# Cyclical Program Review of Academic Programs offered by the Department of Civil Engineering Progress Report on Implementation Plan: 4-year

Date: 2/9/2022

Contact: Ian Moore Head of Department      ian.moore@queensu.ca

Programs	Degrees
Civil Engineering	BASc, MASc, MEng, PhD
Applied Sustainability	MASc, MEng
Geo Engineering	MASc, PhD

*Table 1 Add/delete rows as required*

At the conclusion of the cyclical program review, a final assessment report and implementation plan was agreed by the Teaching and Learning Office and the Deans of the Faculty of Engineering and Applied Science and the School of Graduate Studies. These deans are responsible for monitoring the implementation plan. This report is an important step in the overall cycle of continuous improvement and is an opportunity to reflect on, and document, the progress made on incremental improvements to address recommendations in the implementation plan.

Please complete the table below to report on progress made in the past 4 Years against the implementation plan. Add further explanation, if necessary, in the *additional notes* section.

Please complete this report and return it to [qugap@queensu.ca](mailto:qugap@queensu.ca) by 2/25/2022. The Teaching and Learning Office will review this progress report. It will then be appended to the Deans' annual reports for the 2021-22 academic year, filed in the Office of the Provost and Vice-Principal (Academic). Please note that monitoring reports will be posted on the University web site.

*San Mue*

February 12<sup>th</sup>, 2022

---

*Signature of Unit Head*

---

*Date*

*Bin Sultan*

---

*May 2, 2022*

---

*Signature of Faculty Dean*

---

*Date*

*Fahim bin*

---

*May 10, 2022*

---

*Signature of Dean (SGS)*

---

*Date*

*K. Kolowitz*

---

*May 19, 2022*

---

*Signature of Associate Vice-Principal (Teaching and Learning)*

---

*Date*

Recommendations 6 and 11 were not endorsed by the Provost and Vice-Principal (Academic) and Recommendation 8 is within the purview of the Provost and Vice-Principal (Academic) and thus are not included in this report.

<b>Recommendation 1: Reviewers recommend that the unit find opportunities to offer a broader selection of technical elective courses to fourth year students, including company-sponsored courses, courses from RMC, or alumni.</b>	
<b>Proposed follow-up</b>	Execute Department's plan to consider strategically how to increase technical electives. Explore opportunities to have industrial partners sponsor elective courses and also consult with RMC regarding joint offerings of technical electives
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No
<b>Which <a href="#">support units</a> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b>	N/A
<b>What is the current status of the follow-up?</b>	In process
<b>Include a completion percentage</b>	>75%
<b>Please provide a brief description of the current, completed or planned work</b>	A new technical elective CIVL 472 'Water Treatment' has been approved, and is expected to be offered for the first time in the 2022-23 academic year.

Two new technical electives, CIVL 490 *Selected Topics in Civil Engineering F (fall term)* and CIVL 491 *Selected Topics in Civil Engineering W (winter term)* have been approved. These are described as “*Providing advanced study and application of selected topics in Civil Engineering, these courses will be offered periodically by visiting faculty and professionals. Consult the Department homepage for opportunities*”. An alumnus who is a retired expert on transportation and highway design, Michael Chiu, is currently using CIVL 491 to teach ‘*Introduction to Transportation Engineering*’ in the Winter 2022 term.

The objective is to use these three new courses to ensure that there are at least five 4<sup>th</sup> year List 1 technical electives taught each term. Additionally, **eleven** 400-level (or higher) courses have been added as List 2 Technical Electives since the last CPR, which significantly broadens the course selection for fourth year students<sup>1</sup>.

Further consultation with industry partners and RMC is expected to occur between now and 2024.

**1. New “List 2” tech electives since the 2017-2018 academic calendar (\* denotes 400-level or higher course):**

<i>APSC250 Biology Through an Engineering Lens</i>	<i>MINE272 Applied Data Science</i>
<i>CHEE330 Heat and Mass Transfer</i>	<i>MINE321 Drilling and Blasting</i>
<i>CHEE371 Mitigation of Industrial Pollution</i>	<i>MINE324 Hydraulics for Mining Applications W</i>
<i>CHEE380 Biochemical Engineering</i>	<i>MINE339 Mine Ventilation</i>
<i>GEOE313 Engineering Geology and Geomechanics</i>	<i>*MINE422 Mining and Sustainability</i>
<i>GEOE333 Terrain Evaluation</i>	<i>*MINE459 Risk and Reliability Analysis for Industrial Asset Management, Health &amp; Safety</i>
<i>*GEOE414 Foundations of the Oil and Gas Industry</i>	<i>*MINE472 Mining Systems, Automation, and Robotics</i>
<i>MECH230 Thermodynamics I</i>	<i>MNTCP07 Surveying Principles</i>
<i>MECH341 Fluid Mechanics II</i>	<i>MNTC314 Drilling and Blasting</i>
<i>MECH346 Heat Transfer</i>	<i>*MNTC408 Mine Health and Safety</i>
<i>MECH394 Frontiers in Biomechanical Engineering</i>	<i>*MNTC418 Sustainability and the Environment</i>
<i>*MECH424 Sustainable Product Design</i>	<i>*MNTC423 Geomatics</i>
<i>*MECH465 Computer-Aided Design</i>	<i>*SURP855 Environmental Planning and Management</i>
<i>*MECH495 Ergonomics and Design</i>	<i>CHEE302 Technical Entrepreneurship</i>
<i>MINE201 Introduction to Mining and Mineral</i>	

<b>Recommendation 2: Reviewers recommend that the unit provide opportunity for students in later parts of their program to refresh their understanding of the effects of mental health problems and resources available to address it.</b>	
<b>Proposed follow-up</b>	Target specific courses and activities to educate all undergraduate and graduate students about mental health. Ensure all students are aware of the two FEAS embedded counsellors available to them. Continue to orient graduate students to mental health resources. Frequently review student workload with an eye to minimizing stress.
<b>Responsibility for leading follow-up</b>	Department Head and Associate Dean Academic
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No
<b>Which <a href="#">support units</a> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b>	N/A
<b>What is the current status of the follow-up?</b>	Completed
<b>Include a completion percentage</b>	100%
<b>Please provide a brief description of the current, completed or planned work</b>	The FEAS office has responded to this recommendation by creating the EngWell Hub, an interactive and accessible website providing students with resources to help “engineer their wellness” and support individual needs for health and wellness during the entire duration of their program(s). On the EngWell Hub, engineering-contextual workshops and resources are available relating to academics, mental/physical health, visa and immigration, technology, finances, healthy eating,

	<p>housing, family abroad, and community involvement (<a href="https://engineering.queensu.ca/engwell-hub/">https://engineering.queensu.ca/engwell-hub/</a>).</p> <p>FEAS has also been redeveloping the mental health supports embedded into Student Services. In late 2021, they created and hired for a new Mental Health Programs Lead, who will oversee not only an embedded counsellor, but also a new Wellness Navigator – a role currently under development that is expected to be filled in 2022. A new course called The Science of Mental Health, Well-Being and Resiliency (IDIS 199) has also been added to the list of courses that can act as complementary studies for engineering students. The online course is now available to students throughout the year.</p> <p>The Department Head and Associate Head will continue to collaborate with FEAS through the Associate Dean (Academic) and Student Services to ensure that students are informed each term about mental health support available to them. In addition to the EngWell Hub, additional communications are sent directly via departmental emails, and are posted directly to the onQ pages of individual courses.</p>
--	--

<b>Recommendation 3: Reviewers recommend that the unit make TA training mandatory for first-time TAs and pay them for their time.</b>	
<b>Proposed follow-up</b>	Comply with the current TA/TF collective agreement which outlines required mandatory TA training and compensation.
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No

<b>Which <u>support units</u> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b>	N/A
<b>What is the current status of the follow-up?</b>	Completed
<b>Include a completion percentage</b>	100%
<b>Please provide a brief description of the current, completed or planned work</b>	A training course developed in collaboration with the Engineering Teaching and Learning Team is now a requirement for all new teaching Assistants. These individuals are paid to take the course.

**Recommendation 4: Reviewers recommend that the unit provide additional training for graduate students who have weak skills in handling tools in the lab to ensure that they are not labeled too early as inept or not trustworthy in the labs.**

<b>Proposed follow-up</b>	The Department's safety committee implemented detailed procedures for monitoring graduate student training in the use of laboratory tools and techniques, and that training now evolves over the student's candidature for their graduate degree. The management team and the Department Manager will remind supervisors initially and annually to identify graduate students who need additional training.
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No

Which <u>support units</u> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')	N/A
What is the current status of the follow-up?	Completed
Include a completion percentage	100%
Please provide a brief description of the current, completed or planned work	The department has implemented the following process to address this recommendation: All graduate students are now required to take CIVL 801, the Department's mandatory safety training course, which includes a module on the safe use of tools. In addition, each student receives a personalized safety training checklist that they are required to review with their supervisor throughout their graduate program. The checklist is updated as new training is completed, and when new training is needed. Students are then trained by an appropriate technician in the use of the relevant tools, including an evaluation of their abilities. The technician personalizes the training program to the specific student, recognizing that students have a diverse range of abilities.

<b>Recommendation 5: Reviewers recommend that the unit implement a department-wide graduate seminar series that exposes graduate students to a broader range of research activities that spans all four areas of expertise.</b>	
<b>Proposed follow-up</b>	Management team to look at best practices and develop a plan to incorporate the four areas of expertise into a department-wide graduate seminar series
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing



<b>Are there additional deliverables associated with the proposed follow-up?</b>	No
<b>Which <a href="#">support units</a> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b>	N/A
<b>What is the current status of the follow-up?</b>	In process
<b>Include a completion percentage</b>	75%
<b>Please provide a brief description of the current, completed or planned work</b>	<p>After discussion, the Head provided seed funding to the Environmental, Hydrotechnical and Structural Engineering research groups to develop a graduate seminar series. The Beaty Water Research Centre now has a successful graduate seminar, and both the Hydrotechnical and Structural Groups are holding a small number of seminars each term. The GeoEngineering Centre continues to hold weekly seminars during the Fall and Winter terms.</p> <p>We will review this format annually to determine if the themed seminars are adequately incorporated or whether additional follow-up is needed.</p>

<b>Recommendation 7: Reviewers recommend that the unit improve the gender diversity in the faculty complement.</b>	
<b>Proposed follow-up</b>	Work with the Equity Office on establishing best practices that will attract more female faculty to the department and remove barriers for female applicants
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing

<p><b>Are there additional deliverables associated with the proposed follow-up?</b></p>	<p>No</p>
<p><b>Which <a href="#">support units</a> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b></p>	<p>N/A</p>
<p><b>What is the current status of the follow-up?</b></p>	<p>In process</p>
<p><b>Include a completion percentage</b></p>	<p>50%</p>
<p><b>Please provide a brief description of the current, completed or planned work</b></p>	<p>With assistance from the FEAS HR unit, the Queen’s Equity Office, and others, we have made changes to the way we advertise faculty and technical support positions in civil engineering. For instance, we have begun to incorporate specific language in the job descriptions that aims to provide more welcome and inclusive language to improve appeal to members of equity-seeking groups, with the aim to increase diversity within our applicant pools. We will continue to work with HR to investigate what barriers remain in recruiting women faculty to Kingston/Queen’s.</p> <p>The Department has also recently initiated the recruitment for a Tier 1 Canada Research Chair (CRC) in Geotechnical Engineering or Coastal Engineering – an appointment that is open only to qualified individuals who identify as women<sup>1</sup>. This position is anticipated to be filled by the summer of 2022. As part of this recruitment, the hiring committee participated in Unconscious Bias training to support effective recruitment practices. Moving forward, the Department has committed to working with various support units to provide training of this nature for recruitment committee members.</p> <p>Furthermore, in November 2020, FEAS received a generous donation from an engineering alumnus to create and recruit a <i>Chair for Women in Engineering</i> position with the overarching goal of</p>

	<p>increasing the number of women pursuing engineering and the retention of existing women in the field (<a href="https://engineering.queensu.ca/women-in-engineering/">https://engineering.queensu.ca/women-in-engineering/</a>). The Department supports various initiatives led by the <i>Chair</i> position, such as the WiE Summer Research Grant, which provides funding to women undergraduate students interested in conducting summer research.</p> <p>The FEAS office has also responded to this recommendation by launching the faculty-wide <i>Engineering for Everyone</i> (<a href="https://engineering.queensu.ca/About/engineering-for-everyone/index.html">https://engineering.queensu.ca/About/engineering-for-everyone/index.html</a>), a new collaborative platform to improve equity, diversity, and inclusion in Engineering at Queen's.</p>
--	--

1. "Women" is used because the CRC Program currently employs the categories of the four federally designated groups (FDG) - Women, Indigenous Peoples, Persons with Disabilities, and Members of Visible Minorities - to monitor progress towards meeting equity goals. Queen's has an under-representation of women among Tier 1 Chairholders. The Tri-Agency Institutional Programs Secretariat (TIPS) has established targets for CRC representation, with staggered deadlines for meeting targets between the period of 2020 to 2029. This initiative follows the provisions for a special program as described by the Ontario Human Rights Commission.

<b>Recommendation 9: Reviewers recommend that the unit use its pending growth in faculty membership to engage new research areas that bring new expertise into innovative areas that build upon their strengths.</b>	
<b>Proposed follow-up</b>	FEAS's strategic research plan will be used to inform emerging areas of research that will be supported through new hires.
<b>Responsibility for leading follow-up</b>	Department Head and Dean, FEAS
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No

<p><b>Which <u>support units</u> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate 'N/A')</b></p>	<p>N/A</p>
<p><b>What is the current status of the follow-up?</b></p>	<p>In process</p>
<p><b>Include a completion percentage</b></p>	<p>75%</p>
<p><b>Please provide a brief description of the current, completed or planned work</b></p>	<p>The Department is actively working to enhance our expertise in emerging research topics within our four areas of strength: Environmental Engineering, Geotechnical Engineering, Hydrotechnical Engineering and Structural Engineering, to ensure the research and graduate training teams in these four areas of specialization as amongst the best in Canada, North American or the World. New expertise that has been brought into the Department is as follows:</p> <ul style="list-style-type: none"> <li>a. Dr Sarah Jane Payne, appointed July 2018, brings new expertise in the fate, transport, detection and management of metal contaminants in drinking water distribution systems and premise plumbing, as well as drinking water quality deterioration in distribution systems and premise plumbing and wastewater-based epidemiology using molecular biology tools for the detection of circulating viruses.</li> <li>b. Dr Josh Woods, appointed January 2019, is actively advancing the use of hybrid simulation, an innovative technique where nonlinear computer control of loading pistons (actuators) permits those robotic elements to simulate parts of a structure (multi-story building, bridge, pipeline) that are outside the component being tested in the laboratory).</li> <li>c. Dr Jason Olsthoorn, appointed January 2022, brings new expertise in mixing theory associated with temperature variations in lakes and rivers, including mathematical biology and porous media flow.</li> </ul> <p>The department recently developed a faculty recruitment plan focused on advancing the team's expertise in Climate Change (understanding and working to minimize impacts on infrastructure and the environment). Subsequently a recruitment process commenced for new environmental faculty members in groundwater engineering and water treatment, with emphasis on candidates</p>

	<p>undertaking research in emerging topics like the effects of climate change on permafrost (cryo-hydrogeology) and water treatment to remove pharmaceuticals and emerging contaminants like PFAS (per-and polyfluoroalkyl substances).</p> <p>The FEAS Strategic Plan was released in February 2022 (<a href="https://engineering.queensu.ca/About/strategic-plan/index.html">https://engineering.queensu.ca/About/strategic-plan/index.html</a>) and outlines various objectives for increasing research capacity. The Department will continue to engage with the Strategic Plan moving forward.</p>
--	---

<b>Recommendation 10: Reviewers recommend that the unit make an effort to increase the number and degree of research collaborations within Queen’s, including cognate departments</b>	
<b>Proposed follow-up</b>	Continue to explore potential research collaborations that will build research capacity and productivity and enhance the student learning environment
<b>Responsibility for leading follow-up</b>	Department Head
<b>Timeline for addressing recommendation</b>	Ongoing
<b>Are there additional deliverables associated with the proposed follow-up?</b>	No
<b>Which <a href="#">support units</a> have been engaged as collaborators in supporting additional deliverables? (If no, please indicate ‘N/A’)</b>	N/A

<b>What is the current status of the follow-up?</b>	Completed
<b>Include a completion percentage</b>	100%
<b>Please provide a brief description of the current, completed or planned work</b>	<p>New collaborations have continually been discussed and realised for the last two decades, both within the Department and across the University and beyond. Despite completion of addressing this specific recommendation, the Department is committed to continually facilitating and promoting new research collaborations. As such, this will remain an ongoing priority.</p> <p>In particular, active involvement in three faculty or university research centres is facilitating those partnerships:</p> <ul style="list-style-type: none"> <li>- the Beaty Water Research Centre, leading to collaborations with faculty members in Chemical Engineering, Chemistry, Geography, and Geological Sciences and Geological Engineering.</li> <li>- the GeoEngineering Centre at Queen's – RMC, leading to collaborations with faculty members in Geological Sciences and Geological Engineering, Mining and Civil Engineering at RMC.</li> <li>- Ingenuity Labs, leading to collaborations with faculty members in Electrical and Computer Engineering, Mechanical and Materials Engineering, and Mining.</li> </ul>

**Additional Notes:**

Please note any additional issues affecting progress, if applicable.