



**MEMORANDUM**

**To:** Executive Committee of Faculty Council (April 4, 2023)  
 Faculty Council (April 26, 2023)

**From:** Professor Marianne Hatzopoulou  
 Chair, Engineering Graduate Education Committee (EGEC)

**Date:** March 13, 2023; revised March 29, 2023

**Re:** Engineering Graduate Education Committee Information Update

**REPORT CLASSIFICATION**

This is a routine or minor policy matter that has been approved by the Engineering Graduate Education Committee (EGEC). It will be considered by the Executive Committee for approval and forwarding to Faculty Council for information.

**NEW COURSES APPROVED**

<b>ECE 1660</b>	Risk-Aware and Stochastic Control Theory with Learning.
-----------------	---

**NAME OR CODE CHANGE**

<b>MIE 1626</b>	Modifying the course name from “Data Science Methods and Quantitative Analysis” to “Data Science Methods and Statistical Learning”.
<b>TEP5500</b>	APS5500 (Research Methods and Project Execution) renumbered to TEP5500 (ISTEP course code).

**PROGRAM MODIFICATIONS**

<b>Closure of MIE-SCUT DDP</b>	Proposal to close MIE-SCUT DDP approved. Dual Degree Program involving the University of Toronto’s Department of Mechanical & Industrial Engineering and the South China University of Technology’s School of Mechanical & Automotive Engineering.
<b>New MEng Emphasis</b>	New MEng emphasis in ChemEng in “Environmental Engineering Consulting”. See appended proposal.

**RECOMMENDATION FOR FACULTY COUNCIL**

For information.

# Proposal for a New Emphasis in Environmental Engineering Consulting

## Change to an Existing Graduate Program or Collaborative Specialization

<b>Program being modified:</b>	MEng in Chemical Engineering & Applied Chemistry
<b>Graduate unit:</b>	Chemical Engineering & Applied Chemistry
<b>Faculty/academic division:</b>	Applied Science & Engineering
<b>Dean's office contact:</b>	Julie Audet, Vice-Dean, Graduate Studies Caroline Ziegler, Governance & Programs Officer
<b>Version date:</b>	March 29, 2023

### 1 Summary

	Changing admission requirements		Renaming field, concentration or emphasis*
	Changing program requirements		Renaming of program or collaborative specialization (please notify VPAP before governance)
	Changing timing of program requirements	X	Creating a new emphasis
			Changes to programs affecting an MOA

The Department of Chemical Engineering & Applied Chemistry proposed to offer a new emphasis called "Environmental Engineering Consulting." The Emphasis will be open to MEng students in the Chemical Engineering & Applied Chemistry. Students will be required to complete 4 half courses, totalling 2.0 FCEs, to earn the Emphasis. The course requirements are as follows:

At least **0.5 FCEs** in core courses selected from:

- CHE1151H - Engineering Systems Sustainability
- CHE1431H - Environmental Auditing
- CHE1432H - Technical Aspects of Environmental Regulations
- CME549H - Groundwater Flow and Contamination
- CIV1319H - Chemistry and Analysis of Water and Waste

The remaining courses are electives selected from the following list:

- CHE 561H - Risk Based Safety Management
- CHE1150H - Industrial Water Treatment
- CHE1433H - Air Dispersion Modelling

- CIV536H - Urban Activity, Air Pollution, and Health
- CIV541H - Environmental Biotechnology
- CIV1308H - Physical and Chemical Treatment Processes
- CIV1321H - Large Scale Infrastructure and Sustainability
- CME500 “Fundamentals of Acid Rock Drainage
- JCC1313H - Environmental Microbiology
- JNC2503H - Environmental Pathways

## 2 Effective Date of Change

---

May 1, 2023.

## 3 Academic Rationale

---

- *What are the academic reasons for the change?*

Human activities, including industrial, commercial, and agricultural, are the main factor contributing to environmental contamination, threatening the human well-being and health of the entire planet. The most imminent consequence of these activities is climate change, which has triggered the current climate crisis: extreme weather events have caused floods, landslides, drought, wildfires, and damage to man-made structures and animal habitats. Human activity also poses significant risks to all countries' financial systems and economies.

Governments have designed, adopted, and regularly updated environmental policies and regulations to minimize the harmful effects of human activities on ecosystems. However, several challenges arise from their implementation, including technical challenges such as the design, operation, and optimization of cost-effective technologies for monitoring, mitigating, and remediating the impact of contaminants. Multi-disciplinary teams and stand-alone consultants join efforts during project life cycles to create solutions aligned to these regulations, addressing opportunities to tackle these challenges. Environmental engineering consultants are key participants in planning and executing these projects. Environmental engineering services ensure that systems, plans, and monitoring strategies are developed, implemented, and maintained to meet project objectives. Moreover, the GTA area is the home to many environmental engineering consulting companies, including Stantec, Golder and Hatch, to name a few.

Given the demand for formally trained environmental engineering consultants, a new emphasis is proposed by the Department of Chemical Engineering & Applied Chemistry, with the support of the Department of Civil & Mineral Engineering. The new emphasis in Environmental Engineering Consulting builds on the Faculty's strength. The core of the new emphasis is a set of courses offered by environmental engineering consulting practitioners (e.g. CHE1151H - Engineering Systems Sustainability; CHE1431H - Environmental Auditing and CHE1432H - Technical Aspects of Environmental Regulations)

and foundational courses that build students' competency in conducting environmental engineering consulting (e.g. CIV549H - Groundwater Flow and Contamination and CIV1319H - Chemistry and Analysis of Water and Waste). Moreover, the two engineering departments offer ten highly relevant courses, which students can take to meet the emphasis requirement. Other Faculties also have courses that students can take to broaden their knowledge.

Through this emphasis, students will have opportunities to gain essential knowledge in monitoring, sustainable treatment technologies, modelling, environmental regulations, project management, and risk assessment. The new emphasis will guide students in the MEng program, help them build knowledge, and develop expertise relevant to society. In addition, it is expected that the new emphasis will help emphasize the Faculty's strength in environmental engineering consulting and create new opportunities to establish industrial partnerships through education. Finally, the Department of Chemical Engineering & Applied Chemistry will continue to work with the Department of Civil & Mineral Engineering to enhance the new emphasis, over time, by developing new courses and creating projects and co-op opportunities for MEng students.

## 4 Impact on Students

---

- *Outline the expected impact on continuing and incoming students, if any, and how they will be accommodated.*

Environmental consulting engineers are in high demand. Environmental-related projects to monitor contaminants, and mitigate their effects on the ecosystems, mean that engineers with this training are highly sought after. Hence, this specialized field requires formal training, as this career path cannot quickly pivot.

After completing the requirement (4 half courses), students will earn the emphasis by requesting the notation on their transcripts to the FASE graduate office.

## 5 Consultation

---

- *Describe any consultation undertaken with the students, faculty, Dean and chair/director. Address any major issues discussed.*

The proposal was developed by the Department of Chemical Engineering & Applied Chemistry in consultation with the Department of Civil & Mineral Engineering and the Vice-Dean of Graduate Studies. The proposal was prepared after surveying MEng students in the Chemical Engineering & Applied Chemistry Department. The draft proposal was presented at the Chemical Engineering Departmental meeting. For feedback, the proposal was circulated within the environmental group in the Department of Civil & Mineral Engineering and the Graduate Studies Committee in the Department of Chemical Engineering & Applied Chemistry. Revisions were made to

address the feedback. The Graduate Studies Committee in the Department of Chemical Engineering & Applied Chemistry approved the revised proposal. Subsequently, the proposal was reviewed by the Faculty’s Engineering Graduate Education Committee (EGEC).

Note: A survey conducted in October 2022 by the Graduate Office on MEng students shows that, out of 37 respondents, 70% of the students support the proposed new emphasis.

## 6 Resources

---

- Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries and enrolment/admissions).

None that are not already allocated.

## 7 Governance Approval

---

<b>Unit sign-off</b>	CHE Graduate Studies Committee, November 28, 2022
<b>Dean’s Office sign-off</b>	Julie Audet, Vice-Dean, Graduate Studies, November 30, 2022
<b>Vice-Provost, Academic sign-off</b>	March 2023
<b>Faculty/division council approval (or delegated body) if applicable</b>	Approved on March 10, 2023 by the Engineering Graduate Education Committee (EGEC) on behalf of the Council of the Faculty of Applied Science & Engineering. Received for information by the Council of the Faculty of Applied Science & Engineering on April 26, 2023.

## Appendix A: Calendar Entry

---

MEng students must successfully complete **four half courses (2.0 FCE)**, including **at least one core (0.5 FCE)** course in the following list.

### Core courses

CHE1151H - Engineering Systems Sustainability  
CHE1431H - Environmental Auditing  
CHE1432H - Technical Aspects of Environmental Regulations  
CME549H - Groundwater Flow and Contamination  
CIV1319H - Chemistry and Analysis of Water and Waste

The remaining coursework may be taken from the Elective courses list

### Elective courses

CHE 561H - Risk Based Safety Management  
CHE1150H - Industrial Water Treatment  
CHE1433H - Air Dispersion Modelling  
CIV536H - Urban Activity, Air Pollution, and Health  
CIV541H - Environmental Biotechnology  
CIV1308H - Physical and Chemical Treatment Processes  
CIV1321H - Large Scale Infrastructure and Sustainability  
CME500 - Fundamentals of Acid Rock Drainage  
JCC1313H - Environmental Microbiology  
JNC2503H - Environmental Pathways