



**MEMORANDUM**

**To:** Executive Committee of Faculty Council (March 11, 2021)  
Faculty Council (April 6, 2021)

**From:** Professor Julie Audet  
Chair, Engineering Graduate Education Committee (EGEC)

**Date:** February 26, 2021

**Re:** **EGEC Information Update**

---

**REPORT CLASSIFICATION**

This is a routine or minor policy matter that has been approved by the Engineering Graduate Education Committee on behalf of Faculty Council<sup>1</sup>. It will be considered by the Executive Committee for endorsing and forwarding to Faculty Council for information.

**NEW COURSES APPROVED**

CIV1330	Water, Sanitation, Hygiene and Global Health
MIE1077	AI Applications in Robotics III
MIE1725	Soft Materials and Machines

**MINOR MODIFICATIONS**

APS1018- <i>History and Philosophy of Engineering</i>	Course title changed to <i>The Engineer in Society-Ethics, History and Philosophy</i> ; course description not changed
PhD and MASc in CHE	CHE1102: <i>Research Methods and Project Execution</i> is moved from the from list of required seminar courses to the list of required technical courses. Therefore, CHE1102 will now count towards 0.5 FCE of the total FCE technical coursework requirement of the programs. The total FCE requirement in terms of technical coursework will not change. (See Appendices 1 and 2)

---

<sup>1</sup> As a result of the 2005 Task Force on Graduate Education at the University of Toronto, EGEC has delegated authority to “consider and approve on behalf of Faculty Council and/or recommend to Faculty Council and/or SGS, matters relating to graduate curriculum, policy, new initiatives, program and course changes”.

MEng emphasis in Advanced Water Technologies (CHE, CIV, MSE)	Simplify the description of the emphasis requirements by re-organizing the list of eligible courses into two groups (core courses and elective courses) and by eliminating any sub-categories within these groups. Eliminate the requirement to take specifically CHE1150 <i>Industrial Water Technology</i> as a core course and create the option for students to take one core course from a list of four possible core courses on complementary topics. (See Appendix 3)
--	--

**RECOMMENDATION FOR FACULTY COUNCIL**

For information.

# University of Toronto

## Minor Modification Proposal

### Change to an Existing Graduate Program or Collaborative Specialization

<b>Program/Collaborative Specialization being modified:</b>	PhD
<b>Graduate unit:</b>	Chemical Engineering and Applied Chemistry (CHE)
<b>Faculty/academic division:</b>	Faculty of Applied Science & Engineering (FASE)
<b>Dean's office contact:</b>	Julie Audet, Vice-Dean Graduate Studies, FASE
<b>Version date:</b>	2021-02-11

#### 1. Summary

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

**Summary:**

The Department seeks to:

- (a) Have CHE1102H: *Research Methods and Project Execution* (0.5 FCE) count towards the coursework requirement for the PhD. This coursework requirement has a total of 2.0 FCE for students admitted with a Master's degree and a total of 3.0 FCE for direct-entry and transfer students.
- (b) Perform an editorial change to the SGS calendar entry to better define the requirement related to CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* so that it is made clearer for students that they should enroll themselves in the course continuously during their degree.

\* Anything with a changed/new name requires consultation with VPAP Office prior to governance; if name change implies significant change to what is being offered or how it is being offered, this may be a major modification or new program.

## 2. Effective Date of Change

---

September 2021

## 3. Academic Rationale

---

PhD students are currently required to complete CHE1102H: *Research Methods and Project Execution*, however it is currently considered a Seminar course and is not counted towards their total coursework requirements.

CHE1102H: *Research Methods and Project Execution* was originally developed to replace a “simple” seminar course (CHE2011H, credit/no credit) in which students would provide a presentation on their thesis topic and receive feedback from class members on their presentation skills. Since its creation, CHE1102H has been steadily refined year after year, involving more graded assignments geared towards exploration of the science underpinning their research project, methods to manage and plan their time to completion, identifying knowledge gaps and most recently, the introduction of an Independent Development Plan module. Through course feedback and discussion with students and faculty, feedback indicates “that Students and Faculty acknowledge the time it takes to complete the course and wish that it counts towards their coursework FCEs”.

Finally, PhD students are required to complete CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* eight times during their degree. PhD students are required to complete CHE3001H (0.5 FCE x 8) over the course of their degree program. The course functions as a continuous course but is not coded as such on systems. This results in the department having to manually enroll students eight times in the same seminar course over the duration of their degree. We wish to update the wording in our SGS Calendar Entry to better define the timing of enrollment so that students will understand to enrol themselves continuously in the course.

## 4. Impact on Students

---

Incoming and current PhD students will be able to fully focus their time and energy on CHE1102H as it will now count towards their total FCE coursework requirements.

By automatically enrolling PhD students in CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry*, students will not have to repeatedly ask the Graduate Office to enroll them or go through the late course add/late grade submission requires process.

## 5. Consultation

---

A task force formed under the umbrella of the Graduate Studies Committee consulted with professors and students and formed a recommendation based on wide consultation within both groups. The Graduate Studies Committee reviewed and approved the recommendation, which was presented and discussed at a CHE faculty meeting and then approved by the CHE faculty.

## 6. Resources

---

There are no resource implications as result of this change.

## 7. Governance Approval

---

<b>Unit sign-off</b>	CHE Graduate Studies Committee: 2020-09-17 CHE Faculty Meeting: 2020-09-18
<b>Dean's office sign-off</b>	Julie Audet, Vice-Dean, Graduate Studies: 2021-02-10
<b>Faculty/division council approval (or delegated body) if applicable</b>	Engineering Graduate Education Committee (EGEC) on behalf of FASE Council: 2021-02-19 Received for information by FASE Council: 2021-04-06

## Appendix A: Calendar Entry

---

Track changes are used to indicate where changes have been made.

### Doctor of Philosophy

#### Program Description

The PhD program is designed for students who wish to become an expert in a specific research area and is a stepping stone to a career in academia. Students work alongside world-renowned researchers while gaining profound depth and experience in their field of study.

Applicants may enter the program via one of three routes: 1) following completion of an MASc degree; 2) transfer from the University of Toronto MASc program after completing one year; or 3) direct entry following completion of a bachelor's degree, in exceptional cases. The program can also be taken on a flexible-time basis.

### PhD Program

#### Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Chemical Engineering and Applied Chemistry's additional admission requirements stated below.
- B+ (or equivalent) in each of the last two years of full-time study in the undergraduate program, and successful completion of a research master's degree with an overall average of at least B+ (or equivalent).
- Applicants may enter the PhD program following **completion of an MASc program** with a minimum B+ average and exceptional all-around scientific and intellectual ability as evidenced from theoretical or experimental research, academic standing, initiative, and publication record.

#### Program Requirements

- **Coursework.** Students must complete at least **2.0 full-course equivalents (FCEs) (four graduate half-courses)**:
  - One course must be **CHE 1102H Research Methods and Project Execution (0.5 FCE)** taken once during their program, typically in Year 1.
  - Courses must be selected from the calendar and approved by the student's supervisor and the Graduate Coordinator. At least one of these courses must be taken in a secondary area of study. It is recommended that one of these courses should be selected from Category A: fundamental courses.
  - Normally, PhD students are not allowed to take a 500-level course for credit towards the degree program.
- All Year 1, Year 2, Year 3 and Year 4 students must complete in CHE3001H: Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry in both the Fall and Winter sessions
- ~~Students must complete eight sessions of the CHE 300xH seminar series (Credit/No Credit).~~
- ~~Students must also take CHE 1102H Research Methods and Project Execution once during their program, typically in Year 1.~~

- If not already completed, students must take CHE 2222H *Safety Workshop* and JDE 1000H *Ethics in Research*.
- **Thesis** on a research topic.
- Within 9 to 12 months of starting the PhD program, students must pass a **qualifying examination**.
- Students normally remain in **residence** (full-time, on campus) until the departmental recommendation for the **Doctoral Final Oral Examination** is made, unless special permission to do so has otherwise been granted by the departmental Graduate Studies Committee.
- Students have the option of completing an emphasis in Sustainable Energy as part of their degree program. Please see details in the Chemical Engineering and Applied Chemistry MSc, MEng, PhD Emphases section.

## Program Length

4 years

## Time Limit

6 years

## PhD Program (Transfer)

### Transfer Requirements

- B+ (or equivalent) in each of the last two years of full-time study in the undergraduate program.
- Applicants may enter the PhD program by transferring from the University of Toronto MSc program after completing one year; such students must successfully complete a bypass examination.
- International applicants with a master's degree from outside Canada or the United States may be asked to register in the MSc program and follow the transfer route of entry.

### Program Requirements

- **Coursework.** Students must complete **3.0 full-course equivalents (FCEs)** (six graduate half-courses) and do not have to take a separate PhD qualifying examination.
  - One course must be **CHE 1102H *Research Methods and Project Execution*** (0.5 FCE) taken once during their program, typically in Year 1.
  - Courses must be selected from the calendar and approved by the student's supervisor and the Graduate Coordinator. At least one of these courses must be taken in a secondary area of study. It is recommended that one of these courses should be selected from Category A: fundamental courses.
  - Normally, PhD students are not allowed to take a 500-level course for credit towards the degree program.
- All Year 1, Year 2, Year 3 and Year 4 students must complete in CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* in both the Fall and Winter sessions
- If not already completed, students must take CHE 2222H *Safety Workshop* and JDE 1000H *Ethics in Research*.

- **Thesis** on a research topic.
- Students normally remain in **residence** (full-time, on campus) until the departmental recommendation for the **Doctoral Final Oral Examination** is made, unless special permission to do so has otherwise been granted by the departmental Graduate Studies Committee.
- Students have the option of completing an emphasis in Sustainable Energy as part of their degree program. Please see details in the Chemical Engineering and Applied Chemistry MAsc, MEng, PhD Emphases section.

## Program Length

5 years

## Time Limit

7 years

## PhD Program (Direct-Entry)

### Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Chemical Engineering and Applied Chemistry's additional admission requirements stated below.
- Minimum A– average in each of the final two years of study in the undergraduate program, and participation in a research project (either through an undergraduate thesis or through research conducted in a lab).

### Program Requirements

- **Coursework.** Students must complete at least **3.0 full-course equivalents (FCEs) (six graduate half-courses)**.
  - One course must be **CHE 1102H Research Methods and Project Execution (0.5 FCE)** taken once during their program, typically in Year 1.
  - Courses must be selected from the calendar and approved by the student's supervisor and the Graduate Coordinator. At least one of these courses must be taken in a secondary area of study. It is recommended that one of these courses should be selected from Category A: fundamental courses.
  - Normally, PhD students are not allowed to take a 500-level course for credit towards the degree program.
- All Year 1, Year 2, Year 3 and Year 4 students must complete in CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* in both the Fall and Winter sessions
- ~~Students must complete eight sessions of the CHE 300xH seminar series (Credit/No Credit).~~
- ~~Students must also take CHE 1102H Research Methods and Project Execution once during their program, typically in Year 1.~~
- If not already completed, students must take CHE 2222H *Safety Workshop* and JDE 1000H *Ethics in Research*.
- Within 9 to 12 months of starting the PhD program, students must pass a **qualifying examination**.



- **Thesis** on a research topic.
- Students normally remain in **residence** (full-time, on campus) until the departmental recommendation for the **Doctoral Final Oral Examination** is made, unless special permission to do so has otherwise been granted by the departmental Graduate Studies Committee.
- Students have the option of completing an emphasis in Sustainable Energy as part of their degree program. Please see details in the Chemical Engineering and Applied Chemistry MASc, MEng, PhD Emphases section.

## Program Length

5 years

## Time Limit

7 years

## PhD Program (Flexible-Time)

### Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Chemical Engineering and Applied Chemistry's additional admission requirements stated below.
- B+ (or equivalent) in each of the last two years of full-time study in the undergraduate program, and successful completion of a research master's degree with an overall average of at least B+ (or equivalent).
- Applicants may enter the PhD following completion of an MASc program with a minimum B+ average and exceptional all-around scientific and intellectual ability as evidenced from theoretical or experimental research, academic standing, initiative, and publication record.
- Applicants to the flexible-time PhD option are accepted under the same admission requirements as applicants to the full-time PhD option. However, applicants to the flexible-time PhD option must also demonstrate that they are actively engaged in professional activities related to their proposed program of study.

### Program Requirements

- Students in the flexible-time option will be subject to the same requirements as students in the full-time option.
- **Coursework.** Students must complete at least **2.0 full-course equivalents (FCEs)**.
  - One course must be **CHE 1102H Research Methods and Project Execution (0.5 FCE)** taken once during their program, typically in Year 1.
  - Courses must be selected from the calendar and approved by the student's supervisor and the Graduate Coordinator. At least one of these courses must be taken in a secondary area of study. It is recommended that one of these courses should be selected from Category A: fundamental courses.
  - Normally, PhD students are not allowed to take a 500-level course for credit towards the degree program.

- All Year 1, Year 2, Year 3 and Year 4 students must complete in CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* in both the Fall and Winter sessions
- ~~Students must complete eight sessions of the CHE 300xH seminar series (Credit/No Credit).~~
- ~~Students must also take CHE 1102H *Research Methods and Project Execution* once during their program, typically in Year 1.~~
- If not already completed, students must take CHE 2222H *Safety Workshop* and JDE 1000H *Ethics in Research*.
- Within 16 months of starting the PhD program, students must pass a **qualifying examination**.
- **Thesis** on a research topic.
- Students normally remain in **residence** (full-time, on campus) until the departmental recommendation for the **Doctoral Final Oral Examination** is made, unless special permission to do so has otherwise been granted by the departmental Graduate Studies Committee.
- Students in the PhD program have the option of completing an emphasis in Sustainable Energy as part of their degree program. Please see details in the Chemical Engineering and Applied Chemistry MAsc, MEng, PhD Emphases section.

### Program Length

6 years

### Time Limit

8 years

# University of Toronto

## Minor Modification Proposal

### Change to an Existing Graduate Program or Collaborative Specialization

<b>Program/Collaborative Specialization being modified:</b>	MASc
<b>Graduate unit:</b>	Chemical Engineering & Applied Chemistry (CHE)
<b>Faculty/academic division:</b>	Faculty of Applied Science & Engineering (FASE)
<b>Dean's office contact:</b>	Julie Audet, Vice-Dean, Graduate Studies, FASE
<b>Version date:</b>	2021-02-25

#### 1. Summary

	Changing admission requirements		Renaming field, concentration or emphasis*
X	Changing program requirements		Renaming of program or collaborative specialization (please notify VPAP before governance)
	Changing timing of program requirements		Creating a new emphasis
			Changes to programs affecting an MOA
<p>Summary:</p> <p>The Department seeks to:</p> <ul style="list-style-type: none"> <li>(a) Remove the requirement that one of the required MASc courses be from a list of prescribed Fundamental courses.</li> <li>(b) Have CHE1102H: <i>Research Methods and Project Execution</i> (0.5FCE) count as one of the 1.5 FCE MASc course requirements.</li> <li>(c) Perform an editorial change to the SGS calendar entry to better define the requirement related to CHE3001H: <i>Leading Edge Seminar Series in Chemical Engineering &amp; Applied Chemistry</i> so that it is made clearer for students that they should enroll themselves in the course continuously during their degree.</li> </ul>			

\* Anything with a changed/new name requires consultation with VPAP Office prior to governance; if name change implies significant change to what is being offered or how it is being offered, this may be a major modification or new program.

## 2. Effective Date of Change

---

September 2021

## 3. Academic Rationale

---

Currently, students in the MASc program are required to complete one course (0.5 FCE) from a prescribed list of Fundamental courses. The goal of this requirement was to ensure that students in the MASc complete curriculum that helps them define the science and understand the fundamental concepts that underpin their research project.

MASc students are currently required to complete CHE1102H: *Research Methods and Project Execution*, however it is currently considered a Seminar course and is not counted towards their 1.5 FCE course requirements.

CHE1102H: *Research Methods and Project Execution* (0.5 FCE) was originally developed to replace a “simple” seminar course (CHE2011H, credit/no credit) in which students would provide a presentation on their thesis topic and receive feedback from class members on their presentation skills. Since its creation, CHE1102H has been steadily refined year after year, involving more graded assignments geared towards exploration of the science underpinning their research project, methods to manage and plan their time to completion, identifying knowledge gaps and most recently, the introduction of an Independent Development Plan module. Through course feedback and discussion with students and faculty, feedback indicates that the department’s Fundamental courses do not meet the knowledge requirements for many of our MASc students.

There are no changes to the overall learning outcomes of the program; CHE1102H helps students define what fundamental scientific principles apply to their research, and these fundamental concepts are not fully covered through the department’s current Fundamental course offering. In addition, considering the expansion of this course and the time students require to immerse themselves in the content, the department wishes to (a) remove the Fundamental course requirement, and (b) have CHE1102H count towards the 1.5 FCE course requirements.

The department will continue to offer Fundamental courses but allow students to take them as an option if the content is relevant to their research or choose another course that better meets their needs.

Finally, MASc students are required to complete CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* four times during their two-year degree. We wish to update the wording in our SGS Calendar Entry so that EASI will automatically enroll MASc students in the seminar, reducing the current drain on instructor, student and graduate office resources surrounding late course additions, late course grade submissions related to students not adding the course through ACORN on

their own. The update does not change the course requirements, only better defines the timing of enrollment so students are automatically enrolled in the course.

#### 4. Impact on Students

---

Incoming and current MAsc Students will benefit from the freedom to take courses that are more closely aligned to their research project, will be able to fully immerse themselves in CHE1102H as it now counts towards their 1.5 FCE, and will no longer have to request enrollment in CHE3001H as they will be automatically enrolled in the course and granted access to the Quercus site from the start of each session.

#### 5. Consultation

---

A task force formed under the umbrella of the Graduate Studies Committee consulted with professors and students and formed a recommendation based on wide consultation within both groups. The Graduate Studies Committee reviewed and approved the recommendation, which was presented and discussed at a CHE Faculty meeting and then approved by the CHE faculty.

#### 6. Resources

---

There are no resource implications as result of these changes.

#### 7. Governance Approval

---

<b>Unit sign-off</b>	CHE Graduate Studies Committee: 2020-09-17 CHE Faculty Meeting: 2020-09-18
<b>Dean's office sign-off</b>	Julie Audet, Vice-Dean, Graduate Studies: 2021-02-10
<b>Faculty/division council approval (or delegated body) if applicable</b>	Engineering Graduate Education Committee (EGEC) on behalf of FASE Council: 2021-02-19 Received for information by FASE Council: 2021-04-06

## Appendix A: Calendar Entry

---

Track changes used to indicate where changes have been made.

### Master of Applied Science

#### Program Description

The MASc program is ideal for students who aspire to a rewarding career in research, whether in academia or industry. It is a stepping stone to a doctoral (PhD) degree.

#### Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Chemical Engineering and Applied Chemistry's additional admission requirements stated below.
- A four-year degree (or equivalent) in engineering or the physical/chemical/biological sciences with a B+ average (or equivalent) in each of the last two years of full-time study.

#### Program Requirements

- Each student should discuss possible research projects with several members of the department before selecting a research area and a supervisor. Students must complete a **thesis** on a research topic.
- **Coursework.** Students must **1.5 full-course equivalents (FCEs)** (three graduate half courses) as follows:
  - One of these courses must be **CHE1102H: Research Methods and Project Execution**, typically completed in Year 1.
  - ~~○ One course must normally be selected from Category A: fundamental courses (see courses below).~~
  - At least one course must be selected in an area outside the student's area of research.
  - Only one 500-level course may be taken for credit towards the degree program.
- All Year 1 and Year 2 students must complete in CHE3001H: *Leading Edge Seminar Series in Chemical Engineering & Applied Chemistry* in both the Fall and Winter sessions
- ~~• Students must attend four sessions of the CHE 300xH seminar series (Credit/No Credit).~~
- ~~• Students must complete CHE 1102H Research Methods and Project Execution once during their program, typically in Year 1.~~
- Students must also complete CHE 2222H *Safety Workshop* and JDE 1000H *Ethics in Research*.
- The program requires a minimum full-time **residence** of two sessions (eight months). This means students must be on campus full-time and consequently in geographical proximity to be able to participate fully in the University activities associated with the program.
- Students have the option of completing an emphasis in Sustainable Energy as part of their degree program. Please see details in the Chemical Engineering and Applied Chemistry MASc, MEng, PhD Emphases section.

**Program Length**

6 sessions full-time (typical registration sequence: F/W/S/F/W/S)

**Time Limit**

3 years full-time

# University of Toronto

## Minor Modification Proposal

### Change to an Existing Graduate Program or Collaborative Specialization

<b>Program being modified:</b>	MEng Emphasis in Advanced Water Technologies
<b>Graduate units:</b>	Chemical Engineering and Applied Chemistry (ChemE) Civil and Mineral Engineering (CivMin) Materials Science and Engineering (MSE)
<b>Faculty/academic division:</b>	Faculty of Applied Science and Engineering (FASE)
<b>Dean's office contact:</b>	Julie Audet, Vice-Dean, Graduate Studies, FASE
<b>Version date:</b>	2021-01-11

#### 1. Summary

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

**Summary:**

The MEng emphasis in Advanced Water Technologies currently has one mandatory core course (CHE1150) and a requirement to take an additional core course from a list of 10 eligible courses and two more elective courses from a prescribed list of 16 other elective courses. The change proposed will create more flexibility for students by allowing them to select one core course from a list of four possible courses, in addition to completing three courses selected either from the list of core courses or from the list of electives. The change will also simplify the description of the requirements for the emphasis as it will make it possible to organize the courses in two lists (core courses and elective courses). The change will not impact the learning objectives of the emphasis.

\* Anything with a changed/new name requires consultation with VPAP Office prior to governance; if name change implies significant change to what is being offered or how it is being offered, this may be a major modification or new program.



## 2. Effective Date of Change

---

May 1, 2021

## 3. Academic Rationale

---

Create greater flexibility for students interested in completing the emphasis and simplify the description of the requirements for the emphasis.

## 4. Impact on Students

---

No impact, other than improving the educational experience.

## 5. Consultation

---

This is a minor modification that was discussed and recommended by the Advanced Water Technologies Emphasis Steering Committee (all professors in CIV/CHE/MSE). It was not judged significant enough to bring others into the discussion.

## 6. Resources

---

There are no resource implications as result of this change.

## 7. Governance Approval

---

<b>Unit sign-off</b>	Advanced Water Technologies Emphasis Steering Committee (B Sleep, G Allen, C Jia, R Hofmann, S Andrews, B Andrews): 2020-08-18
<b>Dean's office sign-off</b>	Julie Audet, Vice-Dean, Graduate Studies: 2021-01-11
<b>Faculty/division council approval (or delegated body) if applicable</b>	Engineering Graduate Education Committee (EGEC) on behalf of FASE Council: 2021-02-01 Received for information by FASE Council: 2021-04-06

## Appendix A: Calendar Entry

---

### Emphasis: Advanced Water Technologies (MEng only)

MEng students must successfully complete a total of 4.0 half courses (2.0 FCE). This includes at least one course (**0.5 full-course equivalent [FCE]**) selected from the core course list. The remaining courses must be selected from the elective course list.

Core course list (complete at least one):

- CHE 1150H *Industrial Water Technology*
- CIV 1308H *Physical/Chemical Treatment Processes*
- CIV 1309H *Biological Treatment Processes*
- CIV 1311H *Advanced and Sustainable Drinking Water Treatment*

Elective course list (complete remaining courses):

- CHE 565H *Aqueous Process Engineering*
- CIV 541H *Environmental Biotechnology*
- CIV 549H *Groundwater Flow and Contamination*
- CIV 550H *Water Resources Engineering*
- CIV 1303H *Water Resources Systems Modeling*
- CIV1330H *Water, Sanitation, Hygiene and Global Health*
- CIV 1319H *Chemistry and Analysis of Water and Wastes*
- CIV 1399H *Special Studies in Civil Engineering* (e.g., Water Sanitation and Hygiene; Treatment Wetlands; the topic is subject to obtaining approval from the student's graduate unit)
- CIV 1499H *Special Studies in Civil Engineering* (e.g., Fundamentals of Acid Mine Drainage; the topic is subject to obtaining approval from the student's graduate unit).
- CHE 1213H *Corrosion*
- CHE 1430H *Hydrometallurgy Theory and Practice*
- JCC 1313H *Environmental Microbiology*
- JNC 2503H *Environmental Pathways*
- MIE 1807H *Principles of Measurements*
- STA 1004H *Introduction to Experimental Design*

### Enrolment Contact

Enrolment in the emphasis is permitted at any time during the MEng program.

Upon successful completion of the emphasis requirements and the successful completion of the MEng degree requirements, students will receive a transcript notation from the Faculty Graduate Studies office.