UNIVERSITY OF TORONTO SCARBOROUGH

OFFICE OF THE CAMPUS COUNCIL

FOR APPROVAL **PUBLIC** **OPEN SESSION**

TO: UTSC Academic Affairs Committee

SPONSOR: William Gough, Vice-Principal Academic and Dean
CONTACT INFO: 416-208-7027, vpdean@utsc.utoronto.ca

PRESENTER: Mark Schmuckler, Vice-Dean Undergraduate
CONTACT INFO: 416-208-2978, vdundergrad@utsc.utoronto.ca

DATE: January 8, 2019 for January 15, 2019

AGENDA ITEM: 7

ITEM IDENTIFICATION:

Undergraduate Major Modification- Specialist/Specialist Co-op Programs in Environmental Chemistry, Program Completion Requirements & Enrolment Requirements

JURISDICTIONAL INFORMATION:

Under section 5.6 of its Terms of Reference, the Committee is responsible for approval of "Major and minor modifications to existing degree programs."

The AAC has responsibility for the approval of Major and Minor modifications to existing programs as defined by the University of Toronto Quality Assurance Process (*UTQAP, Section 3.1*).

GOVERNANCE PATH:

1. **UTSC Academic Affairs Committee [For Approval] (January 15, 2019)**

PREVIOUS ACTION TAKEN:

No previous action in governance has been taken on this item.

HIGHLIGHTS:

The Department of Physical and Environmental Sciences (DPES) at the University of Toronto Scarborough (UTSC) is proposing major modifications to the existing Specialist and Specialist (Co-operative) programs in Environmental Chemistry (BSc) to (1) meet the requirements for accreditation from the Canadian Society for Chemistry and (2) ensure students have the preparation they need to achieve program and course learning outcomes.

The overarching changes being proposed are:

- Introduce additional chemistry content to satisfy the requirements for accreditation;
- Introduce a 2.0 CGPA enrolment requirement for the first time.

To ensure the Specialist programs are among the best environmental chemistry programs nationally and internationally, the DPES has been working with the Canadian Society for Chemistry to obtain national accreditation. Accreditation will make the programs more competitive and also demonstrate their high quality.

The proposed changes will add more chemistry depth to the programs, while also ensuring they continue to include the necessary core environmental sciences courses that ensures students are completing a unique program. The additional depth in chemistry will make it possible for the programs to gain national accreditation, which will provide significant benefits to students post-graduation. Accreditation will make the programs more competitive and also demonstrate their high quality both nationally and internationally.

The addition of a 2.0 CGPA enrolment requirement is necessary to ensure students have the preparation they need to achieve the course and program learning outcomes, and also demonstrate a basic level of competency in environmental chemistry upon graduation. This requirement is important to maintain and grow the reputation of this program both nationally and internationally.

The Canadian Society for Chemistry Accreditation Committee notified the Department in October 2018 that the Specialist and Specialist (Co-operative) programs in Environmental Chemistry will be accredited starting in September 2019 (pending approval of the proposed changes).

The proposed changes will not change the existing learning outcomes for the programs; instead the changes will further support students in being able to meet these learning outcomes. The revised programs will include more depth in chemistry yet maintain the core environmental sciences courses that are relevant to environmental chemistry.

Continuing students will be grandfathered and will not be impacted by the proposed changes. Students applying to the program in the 2019-20 academic year will be required

to meet the enrolment requirements and complete the program requirements of the revised program.

The proposed changes have been broadly discussed within the Department of Physical and Environmental Sciences. The proposal has been reviewed by the Dean's Office, the Office of the Vice-Provost, Academic Programs, and the UTSC Campus Curriculum Committee.

FINANCIAL IMPLICATIONS:

There are no net financial implications to the campus operating budget.

RECOMMENDATION:

Be It Resolved,

THAT the major modifications to the Specialist/Specialist (Co-operative) programs in Environmental Chemistry (BSc), as described in the proposal dated November 15, 2018 and recommended by the Vice-Principal Academic and Dean, William Gough, be approved effective as of Fall 2019 for the 2019-20 academic year.

DOCUMENTATION PROVIDED:

1. Major Modification to the Specialist/Specialist (Co-operative) programs in Environmental Chemistry (BSc), dated November 15, 2018.

UNIVERSITY OF TORONTO

University of Toronto
Major Modification Proposal: Significant Modifications to Existing Graduate and Undergraduate Programs

Program being modified:	• Specialist program in Environmental Chemistry (BSc) • Specialist (Co-operative) program in Environmental Chemistry (BSc)
Type of Major Modification:	1. Restructure program completion requirements to meet Canadian Society for Chemistry accreditation requirements. 2. Add a CGPA enrolment requirement for the first time.
Effective Date of Change:	Fall 2019
Department / Unit where the program resides:	Physical & Environmental Sciences
Discipline Area/Calendar Section:	Chemistry
Faculty / Academic Division:	University of Toronto Scarborough
Faculty / Academic Division contact:	Annette Knott, Academic Programs Officer; aknott@utsc.utoronto.ca
Department / Unit contact:	Prof. Myrna Simpson (Program Supervisor) Prof. George Arhonditsis (Chair)
Date of this version of the proposal:	November 15, 2018

1 Summary

The Department of Physical and Environmental Sciences (DPES) at the University of Toronto Scarborough (UTSC) is proposing major modifications to the existing Specialist and Specialist (Co-operative) programs in Environmental Chemistry (BSc) to (1) meet the requirements for accreditation from the Canadian Society for Chemistry and (2) ensure students have the preparation they need to achieve program and course learning outcomes.

The Specialist programs have been growing in popularity due to the DPES's unique expertise and research strength in both environmental science and environmental chemistry. To ensure the programs are among the best environmental chemistry programs nationally and internationally, the Department has been working with the Canadian Society for Chemistry to obtain national accreditation. Accreditation will make the programs more competitive and also demonstrate their high quality. Specialist/Specialist (Co-operative) programs in Chemistry and in Biological Chemistry have recently been similarly accredited; indeed, it was the success of these initiatives that prompted a thorough review of the Environmental Chemistry programs.

The overarching changes being proposed are:

- Introduce additional chemistry content to satisfy the requirements for accreditation;
- Introduce a 2.0 CGPA enrolment requirement for the first time.

The Canadian Society for Chemistry Accreditation Committee notified the Department in October 2018 that the Specialist and Specialist (Co-operative) programs in Environmental Chemistry will be accredited starting in September 2019 (pending approval of the proposed changes).

2 Academic Rationale

The Department of Physical and Environmental Sciences (DPES) at the University of Toronto Scarborough (UTSC) is proposing major modifications to existing Specialist and Specialist (Co-operative) programs in Environmental Chemistry (BSc) to meet the requirements for accreditation from the Canadian Society for Chemistry.

The proposed changes will add more chemistry depth to the programs, while also ensuring they continue to include the necessary core environmental sciences courses that ensures students are completing a unique program. The additional depth in chemistry will make it possible for the programs to gain national accreditation, which will provide significant benefits to students post-graduation. Accreditation will make the programs more competitive and also demonstrate their high quality both nationally and internationally. Plans to seek accreditation for this program were also discussed in the self-study related to the most recent external review of the program (2016-17).

The addition of a 2.0 CGPA enrolment requirement is necessary to ensure students have the preparation they need to achieve the course and program learning outcomes, and also demonstrate a basic level of competency in environmental chemistry upon graduation. This requirement is important to maintain and grow the reputation of this program both nationally and internationally.

3 Description of the Proposed Major Modification(s)

Description of Changes

1. Enrolment requirements:
   - Currently, the Specialist in Environmental Chemistry is an unlimited enrolment program. With the approval of this proposal this program will have enrolment requirements as follows: students may apply to this program after completing at least 4.0 credits from the following: EESA01H3, EESA06H3, BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, MATA30H3, MATA36H3, and PHYA10H3; in addition they must have achieved a cumulative grade point average (CGPA) of at least 2.0.
   - The existing enrolment requirements for the Specialist (Co-operative) program in Environmental Chemistry will not change.
2. Program completion requirements:
   - Courses that are not core to environmental chemistry are being removed and replaced with chemistry courses. This will increase the number of instructional hours in chemistry (including lectures, practicals and tutorials), thereby providing a more guided program and improving the chemistry skills of students. With these changes the programs will achieve the number of chemistry instructional hours needed to qualify for national accreditation by the Canadian Society for Chemistry (chemistry instruction must be at least 1000 hours over all 4 years of the program). In addition, students will gain more laboratory skills and be more proficient in basic chemistry, which will result in their increased competitiveness post-graduation.
   - To achieve this goal, the total number of credits required to complete the program will increase from 15.0 to 16.0 credits.
3. The Calendar entry for the program will be moved from the Environmental Sciences discipline section to the Chemistry discipline section.

Impact on Program's Learning Outcomes

The proposed changes will not change the existing learning outcomes for the program; instead, the changes will further support students in being able to meet these learning outcomes. The revised programs will include more depth in chemistry yet maintain the core environmental sciences courses that are relevant to environmental chemistry. As a result, graduates will be highly proficient in chemistry yet have a strong enough background in environmental sciences to pursue a career in either field (chemistry or environmental sciences). By strengthening the programs and streamlining course choices, the revised programs also ensure that the learning outcomes in fundamental chemistry, with emphasis on the environment, continue to be met.

Program Diversity

The programs already attract a diverse range of students, including a growing population of International students. With accreditation the Department anticipates that diversity will increase as it will attract a wider range of students beyond the current catchment. This program will be the only Environmental Chemistry Specialist accredited in the GTA (the next nearest program is at Queen's University in Kingston).

4 Impact of the Change(s) on Students

Continuing Students:
Continuing students will not be impacted by the changes. They will be grandfathered, and allowed to finish their program as listed in the Calendar in the year they selected it as a Subject POSt. In general, the courses needed to complete the programs will continue to be offered, but where necessary accommodations can be made.

New Students:
The proposed changes, when approved, will take effect as of the 2019-2020 academic year and will apply to students who select the program as a Subject POSt. Students who do not meet the CGPA enrolment requirement, or who prefer a more flexible program, will be advised to consider other options, including: the Major in Chemistry and/or the Major in Environmental Sciences. These options still provide students with a basic degree related to environmental chemistry but will not have the same level of rigor and depth as the Specialist programs. Students will be apprised of the changes through the Academic Calendar, and of their options through student advising efforts in the Department and the Academic Advising & Career Centre.

5 Consultation

The proposed changes were developed by a sub-committee of Profs. Myrna Simpson, Effie Sauer and Mandy Meriano. The DPES Teaching and Learning Committee reviewed and approved the proposal on March 15, 2018. This form was circulated to Chemistry and Environmental Science faculty members via email on March 22, 2018 and circulated to all DPES Faculty in Chemistry and Environmental Sciences. The changes were also broadly discussed at the Environmental Science Faculty meetings held in April and May. No objections to the changes were raised by any faculty members. The proposal was approved at a DPES Council meeting on June 8, 2018.

All courses impacted are DPES-based courses. No other Units at UTSC will be impacted by these changes.

The Program Supervisor, Prof. Myrna Simpson, has been communicating with students in the program since 2011. Informal consultation with various students has revealed that they feel that they lack practical chemistry skills; this is partially rectified with the introduction of CHMD16H3 but additional chemistry content will improve students' knowledge and skill development. Prof. Simpson asked students about the potential for accreditation and students have been unanimously enthusiastic about this prospect.

6 Resources

There are no impacts on teaching, TA, or space/infrastructure resources: no new courses are associated with this proposal, and the Department does not anticipate any increases in enrolments for existing courses.

7 UTSC Administrative Steps

Administrative Steps Required	Date
Departmental Curriculum Committee	• DPES Teaching and Learning Committee: March 15, 2018 • DPES Council: March 22, 2018
Dean's Office Green Light	N/A – no resource implications
Campus Curriculum Committee	November 29, 2018

8 UTQAP/Formal Governance Process

Levels of Approval Required	Date
• **Decanal Sign-Off** • **Provost Office Sign-Off**	• November 1, 2018 • November 14, 2018
UTSC Academic Affairs Committee	January 15, 2019
Submission to Provost's Office	
AP&P – reported annually	
Ontario Quality Council – reported annually	

Appendix A: *Calendar* Copy [showing changes]

~~*Supervisor of Studies*: Myrna Simpson (416) 287-7234~~
~~*Email:* myrna.simpson@utoronto.ca~~

This program is intended for students who want to specialize in Chemistry, but who are also interested in the chemistry of environmental systems.

Supervisor of Studies: Myrna Simpson (416) 287-7234, *Email*: myrna.simpson@utoronto.ca.

Enrolment Requirements

Students may apply to this program after completing at least 4.0 credits from the following: EESA01H3, EESA06H3, BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, MATA30H3, MATA36H3, and PHYA10H3; in addition they must have achieved a cumulative grade point average (CGPA) of at least 2.0. Application for admission to the program is made to the registrar through ROSI. See the UTSC Registrar's website for information on program (Subject POSt) selection, and application window dates at www.utsc.utoronto.ca/subjectpost.

Program Requirements
Total requirements: ~~15.0~~ 16.0 credits

First Year (4.5 credits):
EESA01H3 Introduction to Environmental Science
EESA06H3 Introduction to Planet Earth
BIOA01H3 Life on Earth: Unifying Principles
BIOA02H3 Life on Earth: Form, Function and Interactions
CHMA10H3 Introductory Chemistry I: Structure and Bonding
CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms
MATA30H3 Calculus I for Physical Sciences
MATA36H3 Calculus II for Physical Sciences
PHYA10H3 Physics I for the Physical Sciences

Second Year (4.5 credits):
CHMB16H3 Techniques in Analytical Chemistry
~~CHMB20H3 Chemical Thermodynamics and Elementary Kinetics~~
CHMB23H3 Introduction to Chemical Thermodynamics and Kinetics: Theory and Practice
CHMB31H3 Introduction to Inorganic Chemistry
CHMB41H3 Organic Chemistry I
CHMB42H3 Organic Chemistry II
CHMB55H3 Environmental Chemistry
EESB15H3 Earth History
~~STAB22H3 Statistics I~~
and
0.5 credit from the following:
- CHMB21H3 Chemical Structure and Spectroscopy

- CHMB62H3 Introduction to Biochemistry
and
~~1.0 credit from the following:~~
0.5 credit from the following:
~~- CHMB21H3 Chemical Structure and Spectroscopy~~
- EESB03H3 Principles of Climatology
~~- EESB04H3 Principles of Hydrology~~
~~- EESB05H3 Principles of Soil Science~~
- EESB19H3 Mineralogy

Third Year (4.0 credits):
STAB22H3 Statistics I
CHMC11H3 Principles of Analytical Instrumentation
~~EESC03H3 Geographic Information Systems and Remote Sensing~~
EESC07H3 Groundwater
EESC20H3 Geochemistry
~~CHMB31H3 Introduction to Inorganic Chemistry~~
~~PSCB57H3 Introduction to Scientific Computing~~
and
1.5 credit from the following:
- CHMC16H3 Analytical Instrumentation
- CHMC31Y3 Intermediate Inorganic Chemistry
- CHMC41H3 Organic Reaction Mechanisms
- CHMC42H3 Organic Synthesis
- CHMC47H3 Bio-Organic Chemistry
and
0.5 credit from the following:
- EESB04H3 Principles of Hydrology
- EESB05H3 Principles of Soil Science

Fourth Year (3.0 credits):
CHMD16H3 Environmental and Analytical Chemistry
EESC13H3 Environmental Impact Assessment and Auditing
EESCD02H3 Contaminant Hydrogeology
EESCD15H3 Fundamentals of Site Remediation
~~and~~
~~1.0 credit from the following:~~
~~- EESD02H3 Contaminant Hydrogeology~~
~~- EESD13H3 Environmental Law, Policy and Ethics~~
~~- EESD15H3 Fundamentals of Site Remediation~~
~~- PSCD11H3 Communicating Science: Film, Media, Journalism, and Society~~
and
1.0 credit from the following, including one of CHMD90Y3, CHMD91H3 and CHMD92H3
~~- CHMC21H3 Topics in Biophysical Chemistry~~
~~- CHMC31Y3 Intermediate Inorganic Chemistry~~
~~- CHMC41H3 Organic Reaction Mechanisms~~

~~- CHMC42H3 Organic Synthesis~~
~~- CHMC47H3 Bio-Organic Chemistry~~
- CHMD59H3 ~~Topics in Environmental Chemistry~~ Modelling the Fate of Organic Chemicals in the Environment
- CHMD89H3 Introduction to Green Chemistry
- CHMD90Y3 Directed Research in Chemistry
- CHMD91H3 Directed Research in Chemistry
- CHMD92H3 Advanced Chemistry Laboratory Course

SPECIALIST (CO-OPERATIVE) PROGRAM IN ENVIRONMENTAL CHEMISTRY (SCIENCE)

Co-op Contact: askcoop@utsc.utoronto.ca

The Specialist (Co-op) Program in Environmental Chemistry is a Work Integrated Learning (WIL) program that combines academic studies with paid work terms in the public, private, and/or non-profit sectors. The program provides students with the opportunity to develop the academic and professional skills required to pursue employment in these areas, or to continue on to graduate training in an academic field related to Environmental Chemistry upon graduation.

In addition to their academic course requirements, students must successfully complete the additive Arts & Science Co-op Work Term Preparation courses and a minimum of three Co-op work terms.

Enrolment Requirements

The minimum qualifications for entry are 4.5 credits, including, BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, EESA01H3, EESA06H3, MATA30H3, [MATA35H3 or MATA36H3 or MATA37H3] and PHYA10H3, plus a cumulative GPA of at least 2.5.

Current Co-op Students:

Students admitted to a Co-op Degree POSt in their first year of study must request a Co-op Subject POSt on ACORN upon completion of 4.0 credits and must meet the minimum qualifications for entry as noted above.

Prospective Co-op Students:

In addition to requesting the program on ACORN, prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POSt) must also submit a Co-op Supplementary Application Form, which is available from the Arts & Science Co-op Office (http://www.utsc.utoronto.ca/askcoop/future-co-op-students). Submission deadlines follow the Limited Enrolment Program Application Deadlines set by the Office of the Registrar each year. Failure to submit both the Supplementary Application Form and the program request on ACORN will result in that student's application not being considered.

Program Requirements
Students must complete the program requirements as described in the Specialist Program in Environmental Chemistry.

Co-op Work Term Requirements

Students must satisfactorily complete three Co-op work terms, each of four-months duration. To be eligible for their first work term, students must be enrolled in the Specialist (Co-op) Program in Environmental Chemistry and have completed at least 7.0 credits, including CHMB16H3.

In addition to their academic program requirements, Co-op students complete up to five Co-op specific courses. These courses are designed to prepare students for their job search and work term experience, and to maximize the benefits of their Co-op work terms. They cover a variety of topics intended to assist students in developing the skills and tools required to secure work terms that are appropriate to their program of study, and to perform professionally in the workplace. These courses must be completed in sequence, and are taken in addition to a full course load. They are recorded on transcripts as credit/no credit (CR/NCR) and are considered to be additive credit to the 20.0 required degree credits. No additional course fee is assessed as registration is included in the Co-op Program fee.

Co-op Preparation Course Requirements:

1. COPD01H3 – Foundations for Success in Arts & Science Co-op
- Students entering Co-op from outside of UTSC (high school or other postsecondary) will complete this course in fall of their first year at UTSC
- Current UTSC students entering Co-op in April/May will complete this course in the summer term
- Current UTSC students entering Co-op in July/August will complete this course in the fall term

2. COPD03H3 – Preparing to Compete for your Co-op Work Term
- Prerequisite: COPD01H3
- This course will be completed eight months in advance of the first scheduled work term

3. COPD11H3 – Managing your Work Term Search & Transition to Work
- Prerequisite: COPD03H3
- This course will be completed four months in advance of the first work scheduled work term

4. COPD12H3 – Integrating Your Work Term Experience Part I
- Prerequisite: COPD11H3 and one Co-op work term
- This course will be completed four months in advance of the second scheduled work term

5. COPD13H3 – Integrating Your Work Term Experience Part II
- Prerequisite: COPD12H3 and two Co-op work terms
- This course will be completed four months in advance of the third scheduled work term

Students must be available for work terms in each of the Fall, Winter and Summer sessions and must complete at least one of their required work terms in either a Fall or Winter session. This in turn requires that students take courses during at least one Summer session.

For information on fees, status in Co-op programs, and certification of completion of Co-op programs, see Section 6B.5 of the UTSC *Calendar*.

Appendix B: New Learning Outcomes, and Degree Level Expectations [Undergraduate Programs]

Degree Level Expectations	**Clearly describe the new Program Learning Outcomes.** • Program Learning Outcomes describe what students will know or be able to do at the completion of the program. • Program Learning Outcomes should support the Degree Level Expectations.	**Clearly describe how the revised program design/structure will support the program learning outcomes.**
1. Depth and Breadth of Knowledge Depth of Knowledge: is attained through a progression of introductory, core and specialized courses. Specialized courses will normally be at the C and D levels. Breadth of Knowledge: students will gain an appreciation of the variety of modes of thinking, methods of inquiry and analysis, and ways of understanding the world that underpin different intellectual fields.	Depth and breadth of knowledge in the Specialist/Specialist Co-op in Environmental Chemistry is reflected in students who are able to: - Understand all facets of chemistry taught at the undergraduate level (analytical, environmental, inorganic, organic and physical chemistry); - Develop a strong foundation in fundamental environmental sciences; - Demonstrate excellent chemistry laboratory skills; - Solve problems related to environmental chemistry.	The program design and requirement elements that ensure these student outcomes for depth and breadth of knowledge are based on: - Years 1 and 2 provide a basic foundation in all areas of chemistry. This is necessary to build a strong knowledge base of fundamental chemistry. Also during this period, students are taking several key environmental sciences courses (EESA01H3, EESA06H3, EESB15H3, EESB03H3 or EESB19H3). These environmental sciences courses provide students with a necessary understanding of fundamental environmental sciences. - Year 3 is designed to further strengthen the academic foundation developed in years 1 and 2. Students in Year 3 will take additional chemistry courses relevant to environmental chemistry (such as CHMC11H3) as well as advanced courses in environmental sciences (EESC07H3 and EESC20H3). - Year 4 offers students with more flexibility to select from courses that are specific to their interests as well as the option to conduct basic research (CHMD90H3 or CHMD91Y). CHMD16H3 is a specialized course which was offered in 2017-18 for the first time. This course was designed for the Environmental Chemistry Specialist program and provides students with more experience with advanced analytical techniques used in environmental chemistry.
2. Knowledge of Methodologies Students have a working knowledge of different methodologies and approaches relevant to their area of study. They are able to evaluate the efficacy of	Students completing the Specialist/Specialist Co-op in Environmental Chemistry will have a strong working knowledge in both theoretical and experimental forms of chemistry. The practical components of chemistry	Students will gain a strong working knowledge of chemistry and environmental sciences through B-, C- and D- level courses. CHMB55H3 (Environmental Chemistry) will be taken in year 2 and serve as an introduction to the topic. In year 3, students will take EESC20H3 (Geochemistry) which provides a foundation of

different methodologies in addressing questions that arise in their area of study.	courses will provide students with a range of laboratory skills including: basic chemistry methods, analytical instrumentation, organic synthesis, spectroscopy, and investigating the properties of atoms and molecules. Environmental Sciences courses will provide students with methodology related to: elemental cycling, basic field methods, climatology, hydrology, hydrogeology, contaminated site remediation, earth sciences and geochemistry.	chemistry of the earth and draws on prior coursework in both chemistry and environmental sciences. In EESC13H3, students have the opportunity to apply their knowledge by carrying out risk assessments. Students further apply their knowledge in CHMD16H3 where they learn about practical aspects of environmental and analytical chemistry.
3. Application of Knowledge Students are able to frame relevant questions for further inquiry. They are familiar with, or will be able to seek the tools with which, they can address such questions effectively.	Students completing the Specialist/Specialist Co-op programs in Environmental Chemistry will be able to question their understanding of the subject matter as well as the established understanding of environmental chemistry. In C- and D-level courses, students will be engaged in experiential learning where they must apply their knowledge to solve problems related to their field.	There are several opportunities for students to apply their knowledge in C- and D- level courses. For example, the CHMD16H3 course includes a laboratory practical where the students must identify an unknown compound in a wastewater sample. To solve this, they must apply chemical methods that they have learned earlier in their program. In EESC13H3, students must perform an environmental impact assessment using current regulatory guidelines. This requires students to draw on their basic science foundation as well as environmental science courses. In Year 4, students may also engage in directed research (CHMD90H3 or CHMD91Y) where they must collect data, analyze and interpret and present their findings (as a poster and in a written report).
4. Awareness of Limits of Knowledge Students gain an understanding of the limits of their own knowledge and an appreciation of the uncertainty, ambiguity, and limits to our collective knowledge and how these might influence analyses and interpretations.	Students completing the Specialist/Specialist Co-op programs in Environmental Chemistry will be able to question the limits of their own knowledge and appreciate the limits of environmental chemistry. C- and D -level courses provide students with a better understanding as well as the limitations of methods and knowledge.	Students will gain an appreciation for the limits of the science and their own understanding through more advanced C- and D-level chemistry courses. Complexities and limitations of environmental systems will also be obtained through the C- and D-level courses in environmental sciences. For example, EESC20H3 offers students with uncertainty pertaining to pollutant fate in environmental systems. EESD15H3 provides students with insight into site remediation and how there isn't a "one size fits all" approach to cleaning up polluted sites.
5. Communication Skills Students are able to communicate information, arguments, and analyses accurately and reliably, both orally and in writing.	Students completing the Specialist/Specialist Co-op programs in Environmental Chemistry will develop their communication skills. They will also be engaged in	The C and D level courses will support the development of both written and oral communication skills. Students will achieve these skills through writing of laboratory reports, research and technical papers - and oral

They learn to read and to listen critically.	interpreting and writing about chemical data.	presentations (for example, in EESC13H3 and CHMD16H3).
6. Autonomy and Professional Capacity The education students receive achieves the following broad goals: • It gives students the skills and knowledge they need to become informed, independent and creative thinkers • It instils the awareness that knowledge and its applications are influenced by, and contribute to, society • It lays the foundation for learning as a life-long endeavour	Students completing the Specialist/Specialist Co-op programs in Environmental Chemistry will be highly versed in environmental chemistry. The rigor and depth of this program will enable students to work as a basic chemist as well as pursue interest in environmental chemistry/environmental sciences. Through their coursework, they will emerge as independent and critical thinkers. They will be able to face problems pertaining to environmental chemistry such as for example: fate and transport of contaminants, sampling and analysis of pollutants in soil, water, sediment and air, quantification of compounds, quality assessments, and methods for remediated contaminated sites.	This program supports a basic interest in chemistry and environmental systems. Students will be highly proficient in chemistry but also have a unique understanding of environmental processes. Furthermore, accreditation by the Canadian Society of Chemistry will demonstrate the rigor and high quality of this program. This program also provides students with a strong foundation for graduate work and joint Master's programs (MEnvSci and MT). The BSc in Environmental Chemistry will allow students to pursue pure chemistry (MSc or PhD) or graduate work in the environmental sciences (MEnvSci, MSc or PhD). Students will have flexibility in their future career path but emerge from a rigorous and nationally accredited program.