

FOR APPROVAL

PUBLIC

OPEN SESSION

TO: UTSC Academic Affairs Committee

SPONSOR: Prof. William A. Gough, Vice-Principal Academic and Dean
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DATE: April 20, 2022 for April 27, 2022

AGENDA ITEM: 3

ITEM IDENTIFICATION:

Major Modification: Curriculum and Program Name Change - Specialist/Specialist (Co-op) in Environmental Biology renamed as Specialist/Specialist (Co-op) in Global Environmental Change, UTSC

JURISDICTIONAL INFORMATION:

University of Toronto Scarborough Academic Affairs Committee (AAC) “is concerned with matters affecting the teaching, learning and research functions of the Campus (AAC *Terms of Reference*, 2021, Section 4).” 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] (April 27, 2022)

PREVIOUS ACTION TAKEN:

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

HIGHLIGHTS:

The Department of Physical and Environmental Sciences (DPES) proposes major modifications to the current Specialist and Specialist (Co-op) in Environmental Biology, including a restructuring of the courses required for the program, changing the name of the program to

Global Environmental Change, and a realignment of program learning outcomes to reflect the restructuring.

The current program encompasses training in the biological and ecological dimensions of environmental science. However, in more recent years the subject of environmental biology has come to reflect other areas of systems biology, cell biology, organismal biology, and/ or genetics, rather than the environmental science focus of DPES programs. The proposed modifications and name change are more accurately reflective of the environmental science approach for this program, and better reflect the state of the field of environmental science. The name change also reflects the program's outcomes in core areas of global change science, including climate change, soil science, hydrology, biogeochemistry, food security, and ecosystem functioning. These changes are better representative of the Department's teaching and research strength in core areas of global change science.

The proposed changes modify required and elective courses and rebalance existing requirements, to focus the programs more closely on global environmental change topics, including climate change, soil science, hydrology, biogeochemistry, food security and ecosystem functioning. This will ensure students will gain foundational knowledge on environmental change topics and engage in research-focused courses earlier in their program, in Year 2. As a result, students will be both a) broadly trained in the environmental sciences (through an increase in the number of required core courses in Environmental Science), and (b) expertly trained in the theory and skills directly related to global environmental change (through a more concise suite of advanced Environmental Science courses offered in Years 3 and 4).

As a result of these changes, students in the program will benefit from a revised and streamlined program that addresses contemporary themes in global environmental change science, and offers both in-class and research-based learning opportunities. It is anticipated that incoming students will be able to prepare for careers across academia, non-governmental organizations, as well as the private sector. Students will also be better prepared for graduate study, through the extended focus on undergraduate research opportunities.

FINANCIAL IMPLICATIONS:

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

RECOMMENDATION:

Be It Resolved,

THAT the curriculum changes to the Specialist and Specialist (Co-op) in Environmental Biology, proposed by the Department of Physical and Environmental Sciences, as described in the proposal dated April 8, 2022, be approved, effective September 1, 2022; and

THAT the Specialist and Specialist (Co-op) in Environmental Biology, offered by the Department of Physical and Environmental Sciences, be renamed to the Specialist and Specialist (Co-op) in Global Environmental Change, as described in the proposal dated April 8, 2022, be approved, effective September 1, 2022.

DOCUMENTATION PROVIDED:

1. Proposal: Major Modification: Specialist/Specialist (Co-op) in Environmental Biology dated April 8, 2022.

University of Toronto

Major Modification Proposal:

Significant Modifications to Existing Graduate and Undergraduate Programs

This template should be used to bring forward all proposals for major modifications to existing graduate and undergraduate programs for governance approval under the *University of Toronto Quality Assurance Process (UTQAP)*.

This template (last updated by the Office of the Vice-Provost, Academic Programs on November 9, 2020) is for all proposals for significant modifications to existing graduate and undergraduate programs. It aligns with UTQAP requirements and will help to ensure that all evaluation criteria established by the Quality Council are addressed in bringing forward a proposal. Separate templates have been developed for other types of proposals.

Program being modified: Please specify exactly what program and which components of that are being modified; e.g., BA...specialist, major and minor components.	1. Specialist Program in Environmental Biology (HBSc) 2. Specialist (Co-operative) Program in Environmental Biology (HBSc).
Proposed major modification:	<ul style="list-style-type: none">• Program restructuring, including changes to required and elective courses.• Program title change from Environmental Biology to Global Environmental Change.• Changes to the program learning outcomes in order to better align with the program requirement changes.
Department/unit (if applicable):	Department of Physical and Environmental Sciences
Faculty/academic division:	University of Toronto Scarborough
Dean's Office contact:	Martha Harris Academic Programs Officer martha.harris@utoronto.ca
Proponent:	Dr. George Archontitsis (Chair), Dr. Adam Martin (Program Supervisor)

Version date: Please change as you edit this proposal.	April 8, 2022
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1. Summary

- Please provide a brief summary of the change(s) being proposed as it relates to the current structure of the program.

This proposal is for major modifications to existing Specialist and Specialist (Co-operative) programs in Environmental Biology, including 1) restructuring the program's course requirements, 2) renaming the program to *Specialist Global Environmental Change*, and 3) revising the program learning outcomes.

The Department of Physical and Environmental Sciences (DPES) at the University of Toronto Scarborough (UTSC) currently offers the following Specialist/Specialist (Co-operative) and Major programs in Environmental Science, all leading to the Honours Bachelor of Science (HBS):

1. Specialist/Specialist (Co-operative) programs in Environmental Biology
2. Specialist/Specialist (Co-operative) programs in Environmental Chemistry
3. Specialist/Specialist (Co-operative) programs in Environmental Geoscience
4. Major/Major (Co-operative) programs in Environmental Science

The Department also offers a Major program in Environmental Studies, Minor program in Environmental Science, and Minor program in Natural Sciences and Environmental Management.

The overarching focus of all Environmental Science programs is to consider human activity as a major cause of environmental change. The study of the natural and anthropogenic changes in the environment requires knowledge and understanding spanning many scientific disciplines, including biology, chemistry, geology, geography, mathematics, physics, and ecology. Recent environmental degradation such as surface and subsurface water pollution, air and soil pollution, climate change, depletion of resources, extinction of species and problems of waste disposal are all due to a limited understanding of environmental systems and processes.

Environmental degradation has an impact not only on human well-being, but on all species and most natural systems. The Environmental Science programs provide education and training that produces highly qualified scientists, with exceptional backgrounds in the theory and applications of environmental science, who are able to provide interdisciplinary solutions to contemporary environmental challenges.

All Environmental Science Specialist programs and the Major Program in Environmental Science have earned official accreditation from Environmental Careers

Organization (ECO) Canada and the Canadian Environmental Accreditation Commission (CEAC). These UTSC programs have met the national standard required to earn accredited status, which connects industry and academics in the environmental sector. Graduates of these programs are eligible to receive their Environmental Professional in Training (EPt) designation, which is a developmental certification for emerging environmental professionals. Graduates of these programs are therefore well placed for future employment in consulting, government, non-governmental organizations, and research and teaching, as well as graduate studies.

The existing Specialist/Specialist (Co-operative) programs in Environmental Biology share the overarching focus of all Environmental Science programs, in that they consider human activity as a major cause of environmental change. The current program encompasses training in the biological and ecological dimensions of environmental science. However, in more recent years the subject of environmental biology has come to reflect other areas of systems biology, cell biology, organismal biology, and/ or genetics, rather than the environmental science focus of DPES programs. The proposed modifications and program name change are more accurately reflective of the environmental science approach for this program and better reflect the state of novel and cutting-edge environmental science, as envisioned across DPES programs. The name change also reflects the program's outcomes in core areas of global change science, including climate change, soil science, hydrology, biogeochemistry, food security, and ecosystem functioning.

The current program proposal seeks to address this, by streamlining second, third, and fourth year courses, such that the program presents to students a more specific set of required courses in the core areas of environmental science. This expanded training in required environmental science courses, is presented with an increase in the number of courses relevant to global environmental change, including courses focused on the impacts of global environmental change on the biosphere, climate change impacts and adaptation, and the extent and consequences of human impacts on the environment on geological timescales.

Specifically, the following changes are being made to the Second Year, and the Third and Fourth Year components of the course requirements:

1. Adding required and elective courses;
2. Removing required and elective courses;
3. Shifting required courses to elective courses;
4. Shifting elective courses to required courses;
5. Adding a wider suite of directed research-based courses into the curriculum.

These changes are designed to:

1. Shift the program from a general overview of environmental biology (as described above), to a more focused consideration of global environmental change, including training in a wider range of core areas related to global change science,

including climate change, soil science, hydrology, biogeochemistry, food security, and ecosystem functioning.

2. Ensure students gain key foundational knowledge in topics related to environmental change in Year 2 of the program that they will build on in Years 3 and 4;
3. Ensure students engage in research-focused courses earlier in the programs;
4. Further differentiate DPES programs from programs in adjacent fields in Biological Sciences (e.g., Conservation and Biodiversity).

In addition, the title of the program is being changed to “Specialist in Global Environmental Change”, to more accurately reflect the program’s signal of the emphasis on global environmental change. It also signals the teaching and research strengths of DPES in core areas of global change science.

Impact on Combined Degree Programs

The Specialist/Specialist (Co-operative) programs in Environmental Biology participate in Combined Degree Programs as follows:

Master of Engineering (Faculty of Applied Science and Engineering):

- Environmental Biology (Specialist), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Biology (Specialist Co-op), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Biology (Specialist), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Biology (Specialist Co-op), Honours Bachelor of Science/ Civil Engineering, Master of Engineering

The proposed changes to the Specialist/Specialist (Co-operative) programs in Environmental Biology have no impact on either the admission or program requirements of these Combined Degree Programs. Complete UTSC Calendar copy is given in Appendix C.

Master of Environmental Science (Graduate Department of Physical and Environmental Sciences, UTSC):

- Environmental Biology (Specialist), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Biology (Specialist Co-op), Honours Bachelor of Science/ Master of Environmental Science

The proposed changes to the Specialist/Specialist (Co-operative) programs in

Environmental Biology have no impact on the admission requirements of these Combined Degree Programs. Complete UTSC Calendar copy is given in Appendix D.

The course requirements for these CDPs include the following:

- Complete the following undergraduate courses as part of the HBSc degree requirements:
 - EESC24H3 Advanced Readings in Environmental Science (0.5 credit)
 - EESD10Y3 Research Project in Environmental Science (1.0 credit)

Currently, EESC24H3 is not included as either a required or elective course in the existing Specialist programs. It counts towards the completion of the undergraduate degree, but not the program. Students must be mindful of this reality when they are making their course selection, and ensure they complete the course in addition to the program requirements. In the proposed program EESC24H3 has been added as an elective course to the Third and Fourth Years component of the program requirements. This change will allow students to apply the course to their undergraduate degree, their undergraduate program, and the Combined Degree Program. By including the course as an option, students may be less likely to overlook it, as a requirement of the CDPs.

Complete UTSC Calendar copy is given in Appendix D.

Master of Teaching (Ontario Institute for Studies in Education):

- Environmental Biology (Specialist), Honours Bachelor of Science/ Master of Teaching
- Environmental Biology (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching

The proposed changes to the Specialist/Specialist (Co-operative) programs in Environmental Biology impact the course requirements of these CDPs. Students applying to the Master of Teaching must have two teaching subjects regardless of the concentration they are applying to (Primary/Junior, Junior/Intermediate, or Intermediate/Senior), and must have completed at least 6.0 credits in their first teaching subject and at least 3.0 credits in their second teaching subject.

The course requirements of the existing Specialist/Specialist (Co-operative) programs in Environmental Biology ensure students can complete 6.0 credits in Biology courses, and therefore fits with the Science-Biology teaching subject. Primary advisors for these joint programs have all been consulted during development of the current proposal, and will be made aware of the changes once approved. Additionally, there is Combined Degree Programs Coordinator at UTSC who is responsible for advising students who are interested in the CDPs with the MT. They have been advised of the planned changes to the existing Specialist/Specialist (Co-operative) and will advise

students regarding which courses they will need to take to meet the admission requirements. In the revised program, students can complete a maximum of 5.5 credits in Biology courses. However, there are two environmental science courses – EESC04H3 Biodiversity and Biogeography and EESC30H3 Environmental Microbiology – that focus specifically on biological sciences. A request was sent to OISE asking that these courses be approved as biology courses for the purposes of supporting the “Science-Biology” Teaching Subject. The response from OISE, via email (March 29, 2021) as follows:

Our assessment of teaching subject course prerequisites would typically count the two “replacement” courses you list towards Science-Biology:

EESC04H3 Biodiversity and Biogeography

EESC30H3 Environmental Microbiology

Accordingly, it seems this program remains suitable for the Master of Teaching program, Intermediate/Senior, teaching subject Science-Biology.

Complete UTSC and SGS Calendar copy is given in Appendix E.

2. Effective Date

Fall 2022, for the 2022-23 academic year

3. Academic Rationale

- What are the academic reasons for the change proposed, and how do they fit with the unit’s and division’s academic plans?

Overarching Context

Global Environmental Change is an area of study that is on the leading edge of environmental science research. It encompasses the science that examines how humans are profoundly impacting the natural world. The growing prominence of this area of study is evident in the scientific literature where there are two influential journals in focused on this topic: *Global Environmental Change*, and *Global Change Biology* (with Impact Factors of 10.5 and 8.9, respectively). Re-focusing the existing Specialist/Specialist (Co-operative) programs in Environmental Biology on Global Environmental Change positions UTSC and the Department of Physical and Environmental Sciences (DPES) as a leader in global change science and education.

Environmental Biology has now come to refer to themes at smaller scales of integration, including genetics, cell biology, organismal biology, and systems biology. These themes are not core competencies in DPES, nor are they well reflected by the current program. In the past decade, the term *Global Environmental Change* has come to be defined and understood in the scientific literature and academia, in a manner that is significantly different from *Environmental Biology* (the current program name). Specifically, *Global Environmental Change* has come to encompass multiple aspects of global change science; this includes both human and natural alterations to Earth's atmosphere, lithosphere, biosphere, geosphere, and hydrosphere. In turn, the field of Global Environmental Change addresses multiple applied environmental issues including freshwater provisioning, carbon cycling and climate change, biodiversity conservation, soil management, sustainable agriculture, and food security (among others).

As these areas have come to fall under the umbrella term of *Global Environmental Change*, the term *Environmental Biology* (the current program name) has also been differentiated.

The proposed changes are designed to ensure students are (a) broadly trained in the environmental sciences (through an increase in the number of *required* core courses in Environmental Science), and (b) expertly trained in the theory and skills directly related to the theme of global environmental change (through a more concise suite of *advanced* Environmental Science courses offered in Years 3 and 4). The proposed changes will also provide undergraduate students with expanded opportunities to engage in undergraduate research courses, beginning in Year 2, by more explicitly integrating multiple undergraduate research courses into the curriculum.

Enrolment Requirements (Unchanged)

The enrolment requirements for the existing programs are unchanged in the revised programs. Similarly to the Specialist program in Environmental Biology, the Specialist program in Global Environmental Change will be unlimited enrolment, and students will be able to select the program as a Subject POST after completing 4.0 credits. Similarly to the Specialist (Co-operative) program in Environmental Biology, the Specialist (Co-operative) program in Global Environmental Change will be a limited enrolment program. Students will be able to apply to the program after completing 4.5 credits in specified courses, and must have achieved a CGPA of 2.5.

Changes to Course Requirements

1. In the *Second Year* component of the course requirements, the following changes are being made:
 - ESTB01H3 (Introduction to Environmental Studies) is added as a required course. This change ensures students in the program are exposed to course focused explicitly on

the human causes, consequences, and responses to environmental change (which was previously absent in the existing program).

- CHMB55H3 (Environmental Chemistry), EESB03H3 (Principles of Climatology), EESB04H3 (Principles of Hydrology), and EESB05H3 (Principles of Soil Science) are being changed from optional to required courses. This change ensures that students are completing foundational courses early in the program, including core courses covering soil science, environmental chemistry, hydrology, and climatology (all of which are core departmental teaching and research competencies in DPES).
- BIOB52H3 (Ecology and Evolutionary Biology Laboratory), EESB15H3 (Earth History), and EESB16H3 (Feeding Humans – The Cost to the Planet) are being changed from required to optional courses; while PSCB90H3 (Physical Sciences Research Experience) is being added as an optional course. These are specialized courses relevant to global environmental change, that are focused on laboratory and research skills (BIOB52H3, PSCB90H3), earth sciences (EESB15H3), and food security (EESB16H3). These courses represent new opportunities for students to individualize their programs beginning in Year 2, while the addition of PSCB90H3 (a directed research course) provides opportunity for students to engage with research early in the program.

2. In the *Third and Fourth Year* component of the course requirements, the following changes are being made:

- EESC38H3/ESTC38H3 (The Anthropocene) is added as required courses. This change exposes students to 3rd year courses focused on the theories surrounding the magnitude of human impacts on the environment.
- BIO58H3 (Biological Consequences of Global Change), BIO63H3 (Conservation Biology), and EESD06H3 (Climate Change Impact Assessment) are being changed from optional to required courses. This change increases the number of, and focus on, courses relevant to global environmental change, including courses focused on the impacts of global environmental change on the biosphere (BIO63H3, BIO58H3) and climate change impacts and adaptation (EESD09H3),
- EESC13H3 (Environmental Impact Assessment and Auditing) is being changed from required to optional. This change will accommodate the increased focus at the third year level on the human impacts of environmental change and impacts of global environmental change.
- BIO37H3 (Plants: Life on the Edge), BIOD54H3 (Applied Conservation Biology), EESC16H3 (Field Camp I), EESC18H3 (Limnology), EESC19H3 (Oceanography), EESC24H3 (Advanced Readings in Environmental Science), and EESD11H3 (Advanced Watershed Hydrology) are being added as optional courses. This change expands opportunities for students to customize their programs with courses on plant responses to environmental change (BIO37H3), conservation science (BIOD54H3), applied environmental career skills development (EESC16H3), hydrology (EESC18H3, EESC19H3, EESD11), or advanced topics in environmental science (EESC24H3)

- BIOC59H3 (Advanced Population Ecology), BIOC61H3 (Community Ecology and Environmental Biology), BIOC62H3 (Role of Zoos and Aquariums in Conservation), BIOC65H3 (Environmental Toxicology), BIOD60H3 (Spatial Ecology), BIOD66H3 (Causes and Consequences of Biodiversity), BIOD95H3 (Supervised Study in Biology), BIOD98Y3 (Directed Research in Biology), EESD13H3 (Environmental Law, Policy and Ethics), EESD15H3 (Fundamentals of Site Remediation), and PSCD11H3 (Communicating Science: Film, Media, Journalism and Society) are being removed as optional courses. This change removes a non-coherent set of courses that were focused on themes tangentially related to environmental change, including population biology (BIOC59H3), community ecology (BIOC61H3), zoos and aquarium science (BIOC62H3), ecotoxicology (BIOC65H3), spatial ecology (BIOD60H3), biological research (BIOD95H3, BIOD98Y3), environmental law (EESD13H3), site remediation (EESD15H3), and science journalism (PSCD11H3).

Changing the Program Title

The title of the program is changing from Environmental Biology, to Global Environmental Change. The term “global environmental change” now encompasses the science surrounding how humans are profoundly impacting the natural world, and the significance of this term is well established in the scientific literature: two of leading journals on this topic—i.e., *Global Environmental Change*, and *Global Change Biology*—are regarded as among the most influential journals in the environmental sciences (with Impact Factors of 10.5 and 8.9, respectively). At the same time, prominent environmental science research organizations include references to this term (i.e., UofT’s *Centre for Global Change Science*, and the *American Geophysical Union’s Global Environmental Change* section).

This change therefore supports two key goals. First, it signals to students, faculty, and academic leadership at UTSC and the wider University of Toronto, and other postsecondary institutions, that the DPES and UTSC encompass teaching and research strengths in core areas of global change science, including climate change, soil science, hydrology, biogeochemistry, food security, and ecosystem functioning. Second, it differentiates DPES’ programs and core competencies, which focus on the physical and environmental sciences, from those in other academic units (e.g., programs focused on biodiversity science and conservation biology, within the Department of Biological Sciences).

How the Changes Support the Department and UTSC Academic Goals and Strategic Plan

The proposed changes support the academic goals of the DPES, by generating a named program within DPES that encompasses DPES’ teaching and research strengths in core areas of global change science, including climate change, soil science, hydrology, biogeochemistry, food security, and ecosystem functioning. From this perspective, this name change simultaneously differentiates DPES’ programs and core competencies, that focus on the physical and environmental sciences, from those that exist in other academic units (namely,

programs focused on biodiversity science and conservation biology, within the Department of Biological Sciences).

The proposed changes also support the UTSC Strategic Plan, Inspiring Inclusive Excellence (2020-25) as follows:

1. Strategic direction 1.2: Undertake comprehensive curriculum renewal that builds upon our top-tier teaching, prepares students for the world of work and the disruptions of the future, and supports innovations in inclusive teaching and learning. In line with the objective of this strategic direction, the proposed changes will: “Ensure that graduating students have intellectual and intercultural competencies to be responsible, adaptable global citizens and leaders equipped with tools and transferable skills that enable them to influence the world.”
2. Strategic direction 1.4: Develop academic programs that make University of Toronto Scarborough an exemplar of life-long learning and expand opportunities for non-traditional students. In line with this strategic direction, the proposed changes will: “Create select programs to enhance education required to facilitate career transitions in the new economy.”
3. Strategic direction 2.2: Enhance and grow current and emerging areas of research strength that will differentiate University of Toronto Scarborough as a global research leader in those fields. In line with this strategic direction, the proposed changes will: “Build the capacity in people and infrastructure necessary to realize our vision of global prominence in particular areas of scholarship.”

4. Description of the Proposed Major Modification(s)

- Please describe in detail what changes are being proposed. Major modifications include changes to the program requirements that will significantly change what students will know and be able to do when they complete the program.
- Other major modifications that may be included are significant changes to admission requirements, significant changes to faculty engaged in program; and a change to mode of delivery, change to the language of the program and offering the program at another location or institution.
- Please be explicit about how the learning outcomes have changed and include both previous and proposed learning outcomes or one version of the current learning outcomes with the new learning outcome in track changes. You may wish to use Appendices A and B.
- Describe how the modification reflects [universal design principles](#) and/or how the potential need to provide mental or physical health accommodations has been considered in the development of this modification.

- Describe how the program structure and delivery methods promote student well-being and resiliency in the learning and teaching environment.
- Describe any elements that support a sense of community in the program.
- Please provide calendar copy in track changes or changes highlighted in Appendix C.

Enrolment Requirements (Unchanged)

There are no changes to the enrolment requirements for either the Specialist or Specialist (Co-operative) programs.

The existing Specialist program in Environmental Biology is, and the proposed Specialist program in Global Environmental Change will be, an unlimited enrolment program. Students will be able to select the program as a Subject POST after the completion of 4.5 credits.

The existing Specialist (Co-operative) program in Environmental Biology is, and the proposed Specialist (Co-operative) program in Global Environmental Change, will be a limited enrolment program. To apply to the program, students must complete 4.5 credits, including [BIOA01H3](#), [BIOA02H3](#), [CHMA10H3](#), [CHMA11H3](#), [EESA01H3](#), [EESA06H3](#), [MATA30H3](#), [[MATA35H3](#) or [MATA36H3](#) or [MATA37H3](#)] and [[PHYA10H3](#) or [PHYA11H3](#)]; and they must have achieved a cumulative GPA of at least 2.5.

In addition:

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:

Prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POST) must submit a program request on ACORN, and meet the minimum qualifications noted above. Deadlines follow the Limited Enrolment Program Application Deadlines set by the [Office of the Registrar](#) each year. Failure to submit the program request on ACORN will result in that student's application not being considered.

Changes to Program Requirements

- There are no changes to the *First Year* component of the course requirements.
- In the *Second Year* component of the course requirements, the following changes are being made:
 - ESTB01H3 is added as a required course
 - CHMB55H3, EESB03H3, EESB04H3, and EESB05H3 are being changed from optional to required courses

- BIOB52H3, EESB15H3, and EESB16H3 are being changed from required to optional courses
- PSCB90H3 is added as an optional course
- The total credits in required courses is being increased from 3.5 to 4.5
- The total credits in elective courses are being reduced from 1.0 to 0.5
- The total credits required to complete the component are being increased from 4.5 to 5.0
- In the *Third and Fourth Year* component of the course requirements, the following changes are being made:
 - EESC38H3/ESTC38H3 is added as required courses
 - BIOC58H3, BIOC63H3, and EESD06H3 are being changed from optional to required courses
 - EESC13H3 is being changed from a required to optional course
 - BIOD54H3, EESC16H3, EESC18H3, EESC19H3, EESC24H3, and EESD11H3 are being added as optional courses
 - BIOC37H3, BIOC59H3, BIOC61H3, BIOC62H3, BIOC65H3, BIOD60H3, BIOD66H3, BIOD95H3, BIOD98Y3, EESD13H3, EESD15H3, and PSCD11H3 are being removed as optional courses
 - The total credits for required courses are being increased from 2.0 to 3.5
 - The total credits for elective courses are being reduced from 2.0 to 1.5; of these 1.5 credits, 0.5 credit must now be at the D-level
- The total number of credits to complete the program are being increased from 14.0 to 14.5.

Note: The proposed course changes will also apply to the Specialist (Co-operative) program in Environmental Biology.

Complete Calendar copy for both programs, showing the proposed changes is given in Appendix A. The revised Calendar entry for each program is given in Appendix B.

Change to Program Title:

The program title is being changed from Environmental Biology to Global Environmental Change.

Changes to the Program Learning Outcomes:

The significance of the proposed changes here is reflected by a reconfiguration, reformulation, and expansion of the program learning outcomes. The existing program currently has 13 associated program learning outcomes which are largely aligned with general themes in environmental science. The revised program, will have 17 associated learning outcomes, which entail a greater degree of mastery of core themes in environmental science and global environmental change. This expansion of program learning outcomes

(described below), also represents an expansion of outcomes related to numerical and scientific literacy, within the areas of environmental and global change science.

Depth and Breadth of Knowledge

In the existing Specialist programs, the learning outcomes associated with **Depth and Breadth of Knowledge** are:

- Students will demonstrate the achievement of core competencies across the environmental sciences with a focus on geoscience, ecology, and evolutionary biology.
- Students will demonstrate interdisciplinary expertise in the area of environmental management.
- Students will demonstrate a deep understanding of biodiversity science, conservation biology, and other environmental science disciplines.

In the revised Specialist programs, the learning outcomes associated with **Depth and Breadth of Knowledge** are aligned with those of the existing program, however, they are focused more explicitly on Global Environmental Change, as follows:

- Students will demonstrate the achievement of core competencies across the environmental sciences with a focus on climatology, soil science, biogeochemistry, hydrology, and ecosystem science.
- Students will demonstrate interdisciplinary expertise at the intersection of environmental science, environmental studies, and environmental change.
- Students will demonstrate expertise in the in the theory and skills related to research in the areas of environmental science and global environmental change.

The program structure that supports these learning outcomes are:

- 4.5 FCE at the A-level focusing on core competencies in environmental science, chemistry, mathematics, and physics.
- 4.5 FCE at the B-level focused on soil science, climatology, environmental chemistry, hydrology, statistics, environmental studies, and ecology and evolution.
- 0.5 FCE at the B-level focused on environmental geoscience, laboratory skills, food security, and/ or environmental research.
- 3.5 FCE at the C- or D- level focusing on advanced themes in climate change impact assessment, biodiversity, and socio-economic causes and consequences of global environmental change.
- 1.5 FCE at the C- and D-level focusing on advanced topics in environmental science (including geochemistry, hydrology, geographic information systems, and biodiversity science), and/ or advanced readings and research in environmental sciences.

Knowledge of Methodologies

In the existing Specialist programs, the learning outcomes associated with **Knowledge of Methodologies** are:

- Students will demonstrate a deep understanding of quantitative methods associated with the physical, environmental, and biological sciences.

In the revised Specialist programs, the learning outcomes associated with **Knowledge Methodologies** are aligned with those of the existing program, however, they are focused more explicitly on Global Environmental Change, as follows:

- Students will demonstrate a deep understanding of quantitative and qualitative methods associated with the physical, environmental, and biological sciences.
- Students will demonstrate an ability to analyze quantitative and qualitative the environmental sciences.
- Students will demonstrate a deep understanding of research methodologies employed in the environmental sciences.

The program structure that supports these learning outcomes are:

- 2.5 FCE in quantitative courses including Mathematics, Physics, Data Analysis (STAB22H3), and Scientific Computing (CSCA08/ CSCA20).
- 2.0 FCE in foundational Chemistry and Biology (BIOA01H3, BIOA02H3).
- 4.0 FCE in the environmental sciences, including general Environmental Science (EESA01H3, EESA06H3), Climatology (EESB03H3), Hydrology (EESB04H3), Soil Science (EESB05H3), Environmental Chemistry (CHMB55H3), and Ecology and Evolution (BIOB50H3, BIOB51H3).
- 3.5 FCE in advanced courses from multiple applied disciplines including biodiversity (EESC04H3, BIOC63H3), Environmental Microbiology (EESC30H3), Climate Change Impact Assessment (EESD06H3), Geographic Information Systems (EESC03H3), Global Change Science (BIOC58H3), and the interdisciplinary causes and consequences dimensions of environmental change (EESC38H3/ ESTC38H3).
- 2.0 FCE in courses focused on advanced and quantitative environmental science research (PSCB90H3, EESC24H3, EESD09H3, EESD10H3).

Application of Knowledge

In the existing Specialist programs, the learning outcomes associated with **Application of Knowledge** are:

- Students will demonstrate an ability to frame relevant questions centred on the environmental sciences, biodiversity science and environmental management. In particular, students will be able to frame relevant questions around the intersection of environmental science and environmental biology, primarily targeted in biodiversity conservation.
- Students will demonstrate an ability to identify and use the best tools to address the key problems in environmental science.

In the revised Specialist programs, the learning outcomes associated with **Application of Knowledge** are aligned with those of the existing program, however, they are focused more explicitly on Global Environmental Change, as follows:

- Students will be able to frame specialized research questions that intersect multiple disciplines across the physical environmental sciences including climate science, soil science, biogeochemistry, and hydrology.
- Students will be able to frame questions along multidisciplinary lines of scientific enquiry in the environmental sciences, including for example, in the areas of food security, climate change, and biodiversity conservation.

The program structure that supports these learning outcomes are:

- Program requirements in quantitative reasoning (STAB22, EESB03, EESB04), core and advanced course requirements in the environmental sciences [i.e., general environmental sciences (EESA01, EESA06), climatology (EESB03), hydrology (EESB04), soil science (EESB05), environmental chemistry (CHMB55), and ecology and evolution (BIOB50, BIOB51)], and research opportunities (PSCB90, EESC24, EESD09, EESD10).
- The breadth of courses in the program that ensure students are capable of framing questions that intersect multiple disciplines across the physical environmental sciences and related sub-disciplines including biodiversity (EESC04, BIOC63), environmental microbiology (EESC30), climate change impact assessment (EESD06), geographic information systems (EESC03H3), global change science (BIOC58), and the interdisciplinary causes and consequences dimensions of environmental change (EESC38/ ESTC38).

Awareness of the Limits of Knowledge

In the existing Specialist programs, the learning outcomes associated with **Awareness of the Limits of Knowledge** are:

- Students will demonstrate a deep understanding of core disciplines relevant to environmental science.
- Students will demonstrate an ability to collect and analyze environmental data through field and lab studies.
- Students will demonstrate an ability to use multiple methods for basic and applied analyses of environmental data.

In the revised Specialist programs, the learning outcomes associated with **Awareness of the Limits of Knowledge** are aligned with those of the existing program, however, they are focused more explicitly on Global Environmental Change, as follows:

- Students will demonstrate a deep understanding of core disciplines relevant to environmental science.
- Students will demonstrate a deep understanding of scientific disciplines related to global environmental change.

- Students will demonstrate an ability to collect and analyze environmental data through field and lab studies.
- Students will demonstrate an ability to use multiple methods for basic and applied analyses of environmental data.

The program structure that supports these learning outcomes are:

- 4.0 FCE from courses across multiple diverse disciplines relevant to global environmental change science, including mathematics (MATA30H3, MATA35/ MATA36/ MATA37), Physics, Chemistry, Biology (BIOA01H3, BIOA02H3), and Environmental Studies (ESTB01H3).
- A minimum of 6.0 FCE in courses with a lab component spanning multiple disciplines (e.g., EESA01H3, EESB04H3, EESB05H3, BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, PHYA10H3/ PHYA11H3), and an optional 2.0 FCE in courses related to independent environmental science research and data collection (PSCB90H3, EESC24H3, EESD09H3, EESD10H3).
- 0.5 FCE in statistics (STAB22H3), multiple environmental science courses with pronounced quantitative analysis components (EESB03H3, EESB04H3), and an optional 2.0 FCE in courses related to independent environmental science research and data collection (PSCB90H3, EESC24H3, EESD09H3, EESD10H3).

Communication Skills

In the existing Specialist programs, the learning outcomes associated with **Communications Skills** are:

- Students will be able to deliver effective presentations.
- Students will be able to complete course-based scientific reports based on scientific data.

In the revised Specialist programs, the learning outcomes associated with Communication Skills are aligned with those of the existing program, however, they also include the following:

- Students will be able to write effective essays and deliver effective presentations on scientific themes related to Global Environmental Change.
- Students will be able to write about, discuss, and present findings on both course-based and independent research.

The program structure that supports these learning outcomes are:

- A minimum of 6.0 FCE in courses with a lab component spanning multiple disciplines and requiring completion and submission of written lab reports (e.g., EESA01H3, EESB04H3, EESB05H3, BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, PHYA10H3/ PHYA11H3).
- 1.0 FCE in courses with a focus on the socio-economic dimensions of global environmental change, which rely on essay writing (ESTB01H3, EESC38H3/ ESTC38H3).
- Multiple courses requiring presentation of scientific data and scientific critiques, to small or large student groups (e.g., EESB04H3, EESC38H3/ ESTC38H3).

- 2.0 FCE in courses related to independent environmental science research and data collection (PSCB90H3, EESC24H3, EESD09H3, EESD10H3), all of which include written scientific communication, critical reading and data interpretation, and oral scientific communication to small or large lab groups.

Autonomy and Professional Capacity

In the existing Specialist programs, the learning outcomes associated with Autonomy and Professional Capacity are:

- Students will gain a deep understanding of the most common issues in the fields of environmental and biodiversity science, which are relevant to pressing societal issues including conservation biology.
- Students will demonstrate an ability to develop and test scientific hypotheses in lab- and field settings, in both classroom and independent situations.

In the revised Specialist programs, the learning outcomes associated with Autonomy and Professional Capacity are aligned with those of the existing program, however, they are focused more explicitly on Global Environmental Change, as follows:

- Students will gain a deep understanding the most prominent contemporary issues in the field of global environmental change science, which are highly relevant to pressing societal issues including climate change and sustainability.
- Students will demonstrate an ability to develop and test scientific hypotheses in lab- and field settings, in both classroom and independent situations.

The program structure that supports these learning outcomes are:

- 8.0 FCE that exposes students to the relevance of course work in relation to a multitude of critical societal issues including Climate Change (EESA01H3, EESB03H3), Food Security (EESA01H3, EESB05H3, EESB16H3), Natural Resource Management (EESA06H3, EESB04H3, CHMB55H3), and biodiversity conservation (BIOB50H3, BIOB51H3, EESB04H3). The relationship between these themes and society is further reinforced by required 1.0 FCE that explicitly focuses on the societal implications of global environmental change (ESTB01H3, EESC38H3/ ESTC38H3).
- A minimum of 6.0 FCE in courses with a lab component and optional 2.0 FCE in courses related to independent environmental science research (detailed above), therefore ensuring students are following an enquiry-based scientific program.

5. Impact of the Change on Students

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

- Please detail any consultation with students.

Continuing students will be able to complete the previous version of the program and will not be impacted by the proposed changes. Where necessary course accommodations will be provided, and students will receive advising from the Program Supervisor. Program enrolment requirements will not be changed, therefore new incoming students will not be impacted in terms of enrolment.

New students will benefit from a revised and streamlined program that addresses contemporary themes in global environmental change science, and offers both in-class and research-based learning opportunities. Therefore, we anticipate new incoming students will benefit from training that prepares students for careers across academia, non-governmental organizations, as well as the private sector. We also anticipate this program will better prepare students for graduate study, through the extended focus on undergraduate research opportunities.

6. Consultation

- Describe the impact of the major modification on other programs and any consultation undertaken with the Dean and chair/director of relevant academic units.

Within the Department of Physical and Environmental Sciences

1. Researchers within DPES' Environmental Science Discipline Group, who teach or conduct research related to Global Environmental Change, and the existing Specialist programs (M. Dittrich, M.E. Isaac, C.P. Mitchell, and K.L. Smith). **Consultation: Sept. 5, 2020. No concerns were raised.**
2. The DPES Environmental Science Group (all 16 members). **Consultation: Sept. 15, 2020. Feedback has been incorporated into this proposal.**
3. Representatives from DPES' Environmental Science and Environmental Studies Discipline Groups, who are currently part of DPES' "Climate Change Working Group": a team focused on streamlining DPES' climate change-related program offerings (N. Klenk, L. Tozer, K.L. Smith, and T. Mohsin). **Consultation: Sept. 30, 2020. Feedback has been incorporated into this proposal.**
4. Online survey sent to representative sample of students from DPES' existing undergraduate and graduate programs. **Consultation: Jan. 15, 2022. No concerns were raised, and wide-spread appeal/ support for the thematic changes proposed here was expressed.**

At UTSC

1. Course instructors for BIOC63H3 (Conservation Biology), BIOC37H3 (Plants: Life on the Edge), and BIOC58H3 (Biological Consequences of Global Change).

Consultation: Sept. 30, 2020. No concerns were raised.

2. The Chair of the Department of Biological Sciences.

Consultation: April 8th, 2022. Concerns were raised regarding the implications of increased enrolments in three proposed required courses (BIOC37H3, BIOC58H3, BIOC63H3). In response to these concerns, BIOC37H3 was moved from a proposed required course to an optional course in Year 3. This requirement was subsequently replaced by EESC03H3, which was previously a required courses in this program. Program learning outcomes have been adjusted to reflect this small change. Otherwise, increases in enrolments for the other two courses (BIOC58H3, BIOC63H3) were indicated as being possible, so are retained here.

3. The former and current Associate Chair Undergraduate in DPES (L. Mikhaylichenko and A. Hadzovic, respectively) and DPES' Teaching and Curriculum Committee (inclusive of 17 DPES members across all four DPES disciplines).

Consultation: Oct. 15, 2020. Feedback has been incorporated into this proposal.

4. The Arts and Science Co-op Office (Cynthia Jairam-Persaud). **Consultation: Jan. 15, 2022. Feedback has been incorporated into this proposal. Specifically, the question was raised regarding the ability of students to complete the Co-op under one of three "Typical Work Term Sequences" (as provided by the Co-op Office). Under closer examination, we confirm that this is in fact possible, largely (but not solely) as a function of the flexibility in our program to offer summer study sessions. This specifically includes multiple field course, directed readings, and directed research courses across Years 2-4.**

5. Members of the Graduate DPES Program and Curriculum Committee, regarding the impacts of the changes on the Combined Degree Programs with the MEnvSc.

Consultation: Sept. 30, 2020. Feedback has been incorporated into this proposal.

6. Department of Biological Sciences, Curriculum Committee, via email correspondence and sharing of the proposal with Dr. Aarthi Ashok (Professor and Associate Chair Teaching and Undergraduate Affairs). **Consultation: Oct. 24, 2021. No concerns were raised.**

At the University of Toronto

1. The Ontario Institute for Studies in Education (OISE) regarding the impacts of the changes on the Combined Degree Programs with the Master of Teaching.

Consultation: March 29, 2021. OISE confirms that revised Specialist programs will continue to fit with the Science-Biology teaching subject of the Master of Teaching.

2. The Faculty of Applied Science and Engineering (FASE) regarding the impacts of the changes on the Combined Degree Programs with the Master of Engineering.

Consultation: Jan. 15, 2022. No concerns were raised.

3. Vice Principal Academic and Dean's Office representatives, including A. Knott (Academic Programs Officer) and H. Laurence (Interim Associate Dean Undergraduate Programs & Curriculum and Special Advisor on Undergraduate Initiatives).

Consultation: March 16, 2021.

7. Resources

- Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries and enrolment/admissions.
- Describe any resources that enhance the learning and teaching environment, including resources to promote student well-being and resiliency in the learning and teaching environment. *You may also wish to highlight specific aspects of the following resources and supports as appropriate for the proposed program:*
 - ▶ Library
 - ▶ Co-operative Education
 - ▶ Academic Advising (including international student advising)
 - ▶ Teaching and Learning Office
 - ▶ Technology Support for Teaching and Learning
 - ▶ Distance/Online Learning
 - ▶ Peer Learning Support
 - ▶ Disabilities/Accessibility Services
 - ▶ Student Academic Support Services
 - ▶ Academic Computing Services
 - ▶ Other unit- or program-specific supports/services
- Please be specific where this may impact significant enrolment agreements with the Faculty/Provost's Office.
- Indicate if the major modification will affect any existing agreements with other institutions, or will require the creation of a new agreement to facilitate the major modification (e.g., Memorandum of Understanding, Memorandum of Agreement, etc.). Please consult with the Provost's Office (vp.academicprograms@utoronto.ca) regarding any implications to existing or new agreements.

Faculty, Space, Libraries, Enrolments:

There are no resource implications resulting from the proposed changes on faculty. Faculty who currently engage in teaching and research associated with the existing Specialist programs will be able to engage in teaching and research associated with the revised Specialist programs. In addition, the proposed changes will support the teaching and research of faculty whose interests include Global Environmental Change.

There are no impacts on space. The same spaces that support the existing Specialist programs will support the revised Specialist programs. There are no impacts on library resources.

Overarching UTSC enrolments will not be affected by the proposed changes; however, enrolments in the program may increase. There is capacity in the program, and the associated courses to accommodate such an increase. The proposed changes may result in an increase in enrolments in directed research and/ or readings courses (e.g., PSCB90H3, EESC24H3, EESD09H3, EESD10Y3). There is existing capacity in these courses, and they are able to absorb any increase in enrolments. Additional TA support is needed for the new course associated with this program (**EESC38H3H3/ESTC38H3**), however this cost fits within DPES' annual TA budget. **Therefore, we do not anticipate these changes lead to increases in course TA budgets.**

Impacts on Existing Agreements:

There is an existing MOU with the Faculty of Applied Science and Engineering for the Combined Degree Programs with the Master of Engineering. The proposed changes will not impact this agreement.

Since the Graduate DPES is also located on the UTSC campus, no formal MOU or MOA agreement for the CDPs with the MEnvSc was necessary.

There is currently no formal MOU or MOA with OISE regarding the CDPs with the MT. The proposed changes will be considered when the MOU/MOA is established.

8. UTSC Administrative Steps

Administrative Steps Required	Date
Departmental Curriculum Committee	Sept. 28, 2021

Dean's Office Green Light	March 16, 2021
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9. UTQAP Process

Levels of Approval Required	Date
Decanal Sign-Off	February 15, 2022
Provost Office Sign-Off	April 7, 2022
UTSC Academic Affairs Committee	April 27, 2022
Submission to Provost's Office	
AP&P – reported annually	May 2022
Ontario Quality Council – reported annually	July 2022

10. Appendix A: Calendar Copy with Changes Tracked or Highlighted

SPECIALIST PROGRAM IN **GLOBAL ENVIRONMENTAL CHANGE** ~~ENVIRONMENTAL BIOLOGY~~ (SCIENCE)

Supervisor of Studies: A. Martin (416-287-7326) Email: adam.martin@utoronto.ca

Humans are considered to be the dominant force shaping nearly all of Earth's biotic and abiotic patterns and processes, including those within the world's atmosphere, biosphere, cryosphere, hydrosphere, and lithosphere. Many scientists now suggest that anthropogenic impacts on the environment are so pervasive, that they have moved Earth into a novel geological epoch called "The Anthropocene": a time in Earth's 4.6 billion-year history where humans are the dominate force shaping the environment. In the Specialist program in Global Environmental Change students will gain a deep understanding of: 1) the fundamental environmental processes occurring within Earth's spheres; 2) how humans are profoundly influencing these processes at local and global scales; and 3) how anthropogenic changes to Earth's environment are both unfolding rapidly, and unique in the context of Earth's history. The program entails learning these themes through a comprehensive mix of: 1) core and advanced scientific courses; 2) applied environmental skills courses; and 3) undergraduate environmental research opportunities.

Program Requirements

Total requirements: ~~14.0~~ 14.5 credits

First Year (4.5 credits):

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

EESA01H3 Introduction to Environmental Science

EESA06H3 Introduction to Planet Earth

MATA30H3 Calculus I for Physical Sciences

[MATA35H3 Calculus II for Biological Sciences *or* MATA36H3 Calculus II for Physical Sciences *or* MATA37H3 Calculus II for Mathematical Sciences]*

[PHYA10H3 Physics I for the Physical Sciences *or* PHYA11H3 Physics I for the Life Sciences]

Note: MATA35H3 cannot be used to fulfill the prerequisites for PHYB57H3

Second Year (5.0 credits):

~~[PHYB57H3 Introduction to Scientific Computing *or* CSCA08H3 Introduction to Computer~~

Science I *or* **CSCA20H3 Introduction to Programming**]

BIOB50H3 Ecology

BIOB51H3 Evolutionary Biology

CHMB55H3 Environmental Chemistry (*changes from optional to required*)

EESB03H3 Principles of Climatology (*changes from optional to required*)

EESB04H3 Principles of Hydrology (*changes from optional to required*)

EESB05H3 Principles of Soil Science (*changes from optional to required*)

ESTB01H3 Introduction to Environmental Studies

STAB22H3 Statistics I

and 1.0 0.5 credit from the following:

BIOB52H3 Ecology and Evolutionary Biology Laboratory (*changes from required to optional*)

EESB15H3 Earth History (*changes from required to optional*)

EESB16H3 Feeding Humans - The Cost to the Planet (*changes from required to optional*)

PSCB90H3 Physical Sciences Research Experience

Third and Fourth Years (5.0 credits):

~~2.0~~ *3.5 credits as follows:*

BIOC58H3 Biological Consequences of Global Change (*changes from optional to required*)

BIOC63H3 Conservation Biology (*changes from optional to required*)

EESC03H3 Geographic Information Systems and Remote Sensing

EESC04H3 Biodiversity and Biogeography

EESC30H3 Environmental Microbiology

EESC38H3H3/ESTC38H3 The Anthropocene

EESD06H3 Climate Change Impact Assessment (*changes from optional to required*)

and 2.0 1.5 credits from the following, of which 0.5 credit must be at the D-level:

BIOC37H3 Plants: Life on the Edge

BIOC51H3 Tropical Biodiversity Field Course

BIOC52H3 Ecology Field Course

~~BIOC59H3 Advanced Population Ecology~~

~~BIOC61H3 Community Ecology and Environmental Biology~~

~~BIOC65H3 Environmental Toxicology~~

~~BIOC62H3 The Role of Zoos and Aquariums in Conservation~~

~~(BIOC67H3) Inter-University Biology Field Course~~

and 1.0 credit from the following:

BIOD52H3 Biodiversity and Conservation

BIOD54H3 Applied Conservation Biology

~~BIOD60H3 Spatial Ecology~~

~~BIOD66H3 Causes and Consequences of Biodiversity~~

~~BIOD95H3 Supervised Study in Biology~~

~~BIOD98Y3 Research Project in Biology~~

EESC13H3 Environmental Impact Assessment and Auditing (*changes from required to optional*)

EESC16H3 Field Camp I

EESC18H3 Limnology

EESC19H3 Oceanography

EESC20H3 Geochemistry

EESC24H3 Advanced Readings in Environmental Science

EESD02H3 Contaminant Hydrogeology

~~EESD13H3 Environmental Law, Policy and Ethics~~

~~EESD15H3 Fundamentals of Site Remediation~~

EESD09H3 Research Project in Environmental Science

EESD10Y3 Research Project in Environmental Sciences

EESD11H3 Advanced Watershed Hydrology

~~PSCD11H3 Communicating Science: Film, Media, Journalism, and Society~~

SPECIALIST (CO-OPERATIVE) PROGRAM IN GLOBAL ENVIRONMENTAL CHANGE ENVIRONMENTAL BIOLOGY (SCIENCE)

Co-op Contact: askcoop@utoronto.ca

The Specialist (Co-op) Program in ~~Environmental Biology~~ **Global Environmental Change** 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 Biology 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 or PHYA11H3], 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:

Prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POST) must

submit a program request on ACORN, and meet the minimum qualifications noted above. Deadlines follow the Limited Enrolment Program Application Deadlines set by the [Office of the Registrar](#) each year. Failure to submit 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 Biology~~ **Global Environmental Change**.

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 Biology~~ **Global Environmental Change** and have completed at least 7.0 credits.

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. [COPB50H3](#)/(COPD01H3) – Foundations for Success in Arts & Science Co-op
2. [COPB51H3](#)/(COPD03H3) – Preparing to Compete for your Co-op Work Term
- Students complete this course in first year or a minimum of eight months in advance of the first scheduled work term.
3. [COPB52H3](#)/(COPD11H3) – Managing your Work Term Search & Transition to Work
- This course will be completed four months in advance of the first work scheduled work term. Students are automatically enrolled for this course in the semester that they are job searching for their first work term.
4. [COPC98H3](#)/(COPD12H3) – Integrating Your Work Term Experience Part I
- This course will be completed four months in advance of the second scheduled work term. Students are automatically enrolled for this course when looking for their second work term.

5. [COPC99H3](#)/(COPD13H3) – Integrating Your Work Term Experience Part II

- This course will be completed four months in advance of the third scheduled work term (for programs that require the completion of 3 work terms and/or four months in advance of any additional work terms that have been approved by the Arts and Science Co-op Office. Students are automatically enrolled for this course when looking for their third work term.

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

For information on fees, status in Co-op programs, and certification of completion of Co-op programs, see the [6B.5 Co-operative Programs](#) section or the [Arts and Science Co-op](#) section in the *UTSC Calendar*.

11. Appendix B: Final Calendar Copy

SPECIALIST PROGRAM IN GLOBAL ENVIRONMENTAL CHANGE (SCIENCE)

Supervisor of Studies: A. Martin (416-287-7326) Email: adam.martin@utoronto.ca

Humans are considered to be the dominant force shaping nearly all of Earth's biotic and abiotic patterns and processes, including those within the world's atmosphere, biosphere, cryosphere, hydrosphere, and lithosphere. Many scientists now suggest that anthropogenic impacts on the environment are so pervasive, that they have moved Earth into a novel geological epoch called "The Anthropocene": a time in Earth's 4.6 billion-year history where humans are the dominant force shaping the environment. In the Specialist program in Global Environmental Change students will gain a deep understanding of: 1) the fundamental environmental processes occurring within Earth's spheres; 2) how humans are profoundly influencing these processes at local and global scales; and 3) how anthropogenic changes to Earth's environment are both unfolding rapidly, and unique in the context of Earth's history. The program entails learning these themes through a comprehensive mix of: 1) core and advanced scientific courses; 2) applied environmental skills courses; and 3) undergraduate environmental research opportunities.

Program Requirements

Total requirements: 14.5 credits

First Year (4.5 credits):

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

EESA01H3 Introduction to Environmental Science

EESA06H3 Introduction to Planet Earth

MATA30H3 Calculus I for Physical Sciences

[MATA35H3 Calculus II for Biological Sciences *or* MATA36H3 Calculus II for Physical Sciences *or* MATA37H3 Calculus II for Mathematical Sciences]*

[PHYA10H3 Physics I for the Physical Sciences *or* PHYA11H3 Physics I for the Life Sciences]

***Note:** MATA35H3 cannot be used to fulfill the prerequisites for PHYB57H3

Second Year (5.0 credits):

[CSCA08H3 Introduction to Computer Science I *or* CSCA20H3 Introduction to Programming]

BIOB50H3 Ecology

BIOB51H3 Evolutionary Biology
CHMB55H3 Environmental Chemistry
EESB03H3 Principles of Climatology
EESB04H3 Principles of Hydrology
EESB05H3 Principles of Soil Science
ESTB01H3 Introduction to Environmental Studies
STAB22H3 Statistics I

and 0.5 credit from the following:

BIOB52H3 Ecology and Evolutionary Biology Laboratory
EESB15H3 Earth History
EESB16H3 Feeding Humans - The Cost to the Planet
PSCB90H3 Physical Sciences Research Experience

Third and Fourth Years (5.0 credits):

3.5 credits as follows:

BIOC58H3 Biological Consequences of Global Change
BIOC63H3 Conservation Biology
EESC03H3 Geographic Information Systems and Remote Sensing
EESC04H3 Biodiversity and Biogeography
EESC30H3 Environmental Microbiology
EESC38H3H3/ESTC38H3 The Anthropocene
EESD06H3 Climate Change Impact Assessment

and 1.5 credits from the following, of which 0.5 credit must be at the D-level:

BIOC37H3 Plants: Life on the Edge
BIOC51H3 Tropical Biodiversity Field Course
BIOC52H3 Ecology Field Course
BIOD52H3 Biodiversity and Conservation
BIOD54H3 Applied Conservation Biology

EESC13H3 Environmental Impact Assessment and Auditing
EESC16H3 Field Camp I
EESC18H3 Limnology
EESC19H3 Oceanography
EESC20H3 Geochemistry
EESC24H3 Advanced Readings in Environmental Science
EESD02H3 Contaminant Hydrogeology
EESD09H3 Research Project in Environmental Science
EESD10Y3 Research Project in Environmental Sciences
EESD11H3 Advanced Watershed Hydrology

SPECIALIST (CO-OPERATIVE) PROGRAM IN GLOBAL ENVIRONMENTAL CHANGE (SCIENCE)

Co-op Contact: askcoop@utoronto.ca

The Specialist (Co-op) Program in Global Environmental Change 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 Global Environmental Change 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 or PHYA11H3], 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:

Prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POST) must submit a program request on ACORN, and meet the minimum qualifications noted above. Deadlines follow the Limited Enrolment Program Application Deadlines set by the Office of the Registrar each year. Failure to submit 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 Global Environmental Change.

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 Global Environmental Change and have completed at least 7.0 credits.

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. COPB50H3/(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 or Winter of their first year at UTSC. Enrolment in each section is based on admission category: Typically, students in Computer Science, Mathematics and Statistics enroll in the Fall semester while all other Arts & Science Co-op admission categories enroll in the Winter semester however this may vary year to year.
 - Current UTSC students entering Co-op in April/May will complete this course in the Summer semester.
 - Current UTSC students entering Co-op in July/August will complete this course in the Fall semester.

2. COPB51H3/(COPD03H3) – Preparing to Compete for your Co-op Work Term
 - This course will be completed eight months in advance of the first scheduled work term.

3. COPB52H3/(COPD11H3) – Managing your Work Term Search & Transition to Work
 - This course will be completed four months in advance of the first work scheduled work term.

4. COPC98H3/(COPD12H3) – Integrating Your Work Term Experience Part I
 - This course will be completed four months in advance of the second scheduled work term.

5. COPC99H3/(COPD13H3) – Integrating Your Work Term Experience Part II
 - This course will be completed four months in advance of the third scheduled work term (for programs that require the completion of 3 work terms and/or four months in advance of any additional work terms that have been approved by the Arts and Science Co-op Office).

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

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

For information on fees, status in Co-op programs, and certification of completion of Co-op programs, see the 6B.5 Co-operative Programs section or the Arts and Science Co-op section in the UTSC *Calendar*.

12. Appendix C: Calendar Copy for Combined Degree Programs with the Master of Engineering

UTSC Calendar Copy

a. COMBINED DEGREE PROGRAMS, HONOURS BACHELOR OF SCIENCE / MASTER OF ENGINEERING

The Combined Degree Programs for UTSC Honours Bachelor of Science (HBSc) and Master of Engineering (MEng) allow exceptional students who are registered in one of the Specialist/Specialist Co-op programs identified below to apply during Year 3 of their studies, and be considered, for admission to the Faculty of Engineering & Applied Chemistry MEng programs in either Chemical Engineering & Applied Chemistry or Civil Engineering.

Contact Information:

Mandy Meriano(416-208-2775)

Email: mmeriano@utsc.utoronto.ca

Combined Degree Programs options are:

- ~~Environmental Biology~~ **Global Environmental Change** (Specialist), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist Co-op), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist Co-op), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Chemistry (Specialist), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Chemistry (Specialist Co-op), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Chemistry (Specialist), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Chemistry (Specialist Co-op), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Geoscience (Specialist), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Geoscience (Specialist Co-op), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering

- Environmental Geoscience (Specialist), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Geoscience (Specialist Co-op), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Physics (Specialist), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Physics (Specialist Co-op), Honours Bachelor of Science/ Chemical Engineering & Applied Chemistry, Master of Engineering
- Environmental Physics (Specialist), Honours Bachelor of Science/ Civil Engineering, Master of Engineering
- Environmental Physics (Specialist Co-op), Honours Bachelor of Science/ Civil Engineering, Master of Engineering

Application Process:

- UTSC students in Year 3 of one of the identified HBSc programs who are interested in one of the identified CDPs must contact Professor M. Meriano before the end of the Fall session.
- Qualified UTSC students will be able to apply to their selected CDP.
- UTSC students who are accepted to the CDP will receive a conditional offer to start the Master of Engineering (MEng) program upon completion of their HBSc program requirements.

Minimum Admission Requirements:

- Applicants must meet the admission requirements of the HBSc program, the School of Graduate Studies, and the MEng program.
- Applicants to the HBSc program must:
 - be enrolled full-time and in good standing;
 - have a B+ average (CGPA of 3.3) or higher in Year 2;
 - carry a full course load of 5.0 credits each year (i.e., complete 5.0 credits over the three academic sessions - Fall, Winter, Summer).
- Applicants to the MEng program must:
 - maintain a B+ average (CGPA of 3.3) or higher in Year 3 and Year 4 of their HBSc program;
 - complete the requirements of their HBSc program;
 - be conferred with the HBSc degree.

Program Requirements and Path to Completion:

- Year 1 to 4: HBSc degree requirements:
 - students must complete all HBSc program requirements and degree requirements;
 - students are expected to carry a full course load of 5.0 credits over the three academic sessions (Fall, Winter, Summer) of each year;
 - in Year 3, qualified students may apply to the CDP and may be offered conditional admission to the MEng program;
 - in Year 4, students who receive a conditional offer of admission to the CDP and MEng:
 - **must complete two prescribed undergraduate engineering half courses (1.0 credit) as part of the HBSc degree requirements;**

- may complete up to 1.0 credit in graduate courses with the permission of either the Department of Chemical Engineering and Applied Chemistry or Department of Civil Engineering (depending on the selected CDP); these courses can be counted towards the completion of both the HSc degree requirements and the MEng program and degree requirements.
 - by the end of Year 4, fulfill both the undergraduate program requirements and the undergraduate degree requirements.
- Year 5: Remaining MEng program and degree requirements:
 - conditions of admission are removed;
 - complete 5.0 credits in MEng courses; students who have completed up to 1.0 credit in MEng courses in Year 4 may subtract those courses from the total 5.0 credits required.

13. Appendix D: Calendar Copy for Combined Degree Programs with the Master of Environmental Science

UTSC Calendar Copy

a. COMBINED DEGREE PROGRAMS, HONOURS BACHELOR OF SCIENCE / MASTER OF ENVIRONMENTAL SCIENCE

The Combined Degree Programs for UTSC Honours Bachelor of Science (HBS) with the Master of Environmental Science (MEnvSc) offered by the Graduate Department of Physical and Environmental Sciences allow exceptional students who are registered in one of the Specialist/Specialist Co-op programs identified below to apply during Year 3 of their studies, and be considered, for admission to the MEnvSc program. They are designed for students interested in pursuing a career in environmental sciences within the green-sector, geosciences, industry, consulting, government and policy organizations. These Combined Degree Programs give students the opportunity to: (1) begin exploring their academic interests in Year 4 of their studies; (2) complete 1.0 credit in courses that may be counted towards both degrees; and (3) enrol in the MEnvSc in the Summer session between Years 4 and 5 in order to complete either a two-month academic or internship opportunity, in addition to the mandatory four-month academic or internship opportunity completed in the MEnvSc program alone.

Contact Information:

Combined Degree Programs Coordinator
Email: cdp.utsc@utoronto.ca

The Combined Degree Programs options are:

Department of Biological Sciences

- Conservation and Biodiversity (Specialist), Honours Bachelor of Science/ Master of Environmental Science
- Integrative Biology (Specialist), Honours Bachelor of Science/ Master of Environmental Science

Department of Physical and Environmental Sciences

- ~~Environmental Biology~~ **Global Environmental Change** (Specialist), Honours Bachelor of Science/ Master of Environmental Science
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist Co-op), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Chemistry (Specialist), Honours Bachelor of Science/ Master of Environmental Science

- Environmental Chemistry (Specialist Co-op), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Geoscience (Specialist), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Geoscience (Specialist Co-op), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Physics (Specialist), Honours Bachelor of Science/ Master of Environmental Science
- Environmental Physics (Specialist Co-op), Honours Bachelor of Science/ Master of Environmental Science

Application Process:

- Applicants must apply to the Honours Bachelor of Science (HBS) program, the MEnvSc program, and the CDP.
- Qualified students in Year 3 of their HBS degree program apply to the MEnvSc program and their chosen CPD through the SGS Online Admission Application system:
 - students will select one of the three fields of study within the MEnvSc program at the time of application:
 - Climate Change Impacts and Adaptation
 - Conservation and Biodiversity, or
 - Terrestrial and Aquatic Systems
 - those accepted will receive a conditional offer to start the MEnvSc program upon completion of their HBS program and degree requirements.

Minimum Admission Requirements:

To be considered for **conditional admission to the MEnvSc program and the selected CDP**, applicants must meet the following admission requirements:

- Be admitted to the HBS degree and one of the above listed undergraduate programs at UTSC.
- Meet the minimum admission requirements of the School of Graduate Studies and the MEnvSc program.
- Be enrolled full-time and in good standing in the HBS program:
 - have a B+ average (CGPA of 3.3) or higher in Year 2;
 - carry a full course load of 5.0 credits each year (i.e., complete 5.0 credits over the three academic sessions - Fall, Winter, Summer); where necessary, exceptions will be made for students in Co-op programs.
- Complete the following undergraduate courses as part of the HBS degree requirements:
 - Students in the Specialist in Conservation and Biodiversity or the Specialist in Integrative Biology:
 - BIOC63H3 Conservation Biology (0.5 credit)
 - BIOD54H3 Applied Conservation Biology (0.5 credit)
 - Students in the Specialist/Specialist Co-op programs in ~~Environmental Biology~~ **Global Environmental Change**, Environmental Chemistry, Environmental Geoscience, or Environmental Physics:
 - EESC24H3 Advanced Readings in Environmental Science (0.5 credit)
 - EESD10Y3 Research Project in Environmental Science (1.0 credit)

To be given **full, unconditional admission to the MEnvSc program**, applicants must meet the following admission requirements:

- Maintain a B+ average (CGPA of 3.3) or higher in their final year of study in the HBSc program or over upper-level (C- and D-level) courses.
- Achieve at least a grade of B- (70%) in both of the graduate courses taken in Year 4 of undergraduate study; these courses must be chosen in consultation with the Graduate Program Supervisor:
 - for the field in Climate Change Impacts and Adaptation: EES 1133H Climate Change Science and Modelling (0.5 credit), plus an additional 0.5 credit;
 - for the field in Conservation and Biodiversity: EES 3002H Conservation Policy (0.5 credit), plus an additional 0.5 credit;
 - for the field in Terrestrial and Aquatic Systems: 1.0 credit.
- Be conferred with the HBSc degree.

Program Requirements and Path to Completion:

- Year 4: HBSc degree requirements
 - students must complete all HBSc program requirements and degree requirements;
 - students are expected to carry a full course load of 5.0 credits over the three academic sessions (Fall, Winter, Summer) of each year; where necessary, exceptions will be made for students in Co-op programs;
 - students who receive a conditional offer of admission to the CDP must complete the following undergraduate courses:
 - students in the Specialist in Conservation and Biodiversity or the Specialist in Integrative Biology:
 - BIOC63H3 Conservation Biology (0.5 credit)
 - BIOD54H3 Applied Conservation Biology (0.5 credit)
 - students in the Specialist/Specialist Co-op programs in ~~Environmental Biology~~ **Global Environmental Change**, Environmental Chemistry, Environmental Geoscience, or Environmental Physics:
 - EESC24H3 Advanced Readings in Environmental Science (0.5 credit)
 - EESD10Y3 Research Project in Environmental Science (1.0 credit)
 - students must complete 1.0 credit in graduate courses, chosen in consultation with the Graduate Program Supervisor, as follows:
 - for the field in Climate Change Impacts and Adaptation: EES 1133H Climate Change Science and Modelling (0.5 credit), plus an additional 0.5 credit;
 - for the field in Conservation and Biodiversity: EES 3002H Conservation Policy (0.5 credit), plus an additional 0.5 credit;
 - for the field in Terrestrial and Aquatic Systems: 1.0 credit.
- Optional registration in the Summer session prior to Year 5:
 - students complete one of the following opportunities:
 - EES 4001H Internship Training (0.5 credit)
 - EES 4003H Academic Training (0.5 credit)
- Year 5: Remaining MEnvSc program and degree requirements.

14. Appendix E: Calendar Copy for Combined Degree Programs with the Master of Teaching

UTSC Calendar Copy

a. COMBINED DEGREE PROGRAMS, HONOURS BACHELOR OF SCIENCE OR HONOURS BACHELOR OF ARTS / MASTER OF TEACHING

The Combined Degree Programs for UTSC Honours Bachelor of Science (HBSc)/ Honours Bachelor of Arts (HBA) with the Master of Teaching (MT) offered by the Ontario Institute for Studies in Education are designed for students who are interested in a career in Education. They allow exceptional students who are registered in one of the 50 identified Specialist and Major programs to gain early admission to the MT, which is a full-time professional program that leads to both a Master's degree and eligibility to become a certified teacher in Ontario. Students who successfully complete one of the Combined Degree Programs listed below will earn two University of Toronto degrees (HBA/ HBSc and MT), and be recommended to the Ontario College of Teachers for a Certificate of Qualifications as elementary or secondary school teachers.

Contact Information:

Combined Degree Programs Coordinator
Email: cdp.utsc@utoronto.ca

The Combined Degree Programs options are:

Department of Anthropology

- Evolutionary Anthropology (Specialist), Honours Bachelor of Science/ Master of Teaching
- Evolutionary Anthropology (Major), Honours Bachelor of Science/ Master of Teaching
- Socio-Cultural Anthropology (Specialist), Honours Bachelor of Arts/ Master of Teaching
- Socio-Cultural Anthropology (Major), Honours Bachelor of Arts/ Master of Teaching

Department of Arts, Culture and Media

- Theatre and Performance Studies (Major), Honours Bachelor of Arts/ Master of Teaching

Department of Biological Sciences

- Biology (Major), Honours Bachelor of Science/ Master of Teaching

- Conservation and Biodiversity (Specialist), Honours Bachelor of Science/ Master of Teaching
- Conservation and Biodiversity (Major), Honours Bachelor of Science/ Master of Teaching
- Human Biology (Specialist), Honours Bachelor of Science/ Master of Teaching
- Human Biology (Major), Honours Bachelor of Science/ Master of Teaching
- Integrative Biology (Specialist), Honours Bachelor of Science/ Master of Teaching
- Molecular Biology and Biotechnology (Specialist), Honours Bachelor of Science/ Master of Teaching
- Molecular Biology and Biotechnology (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Molecular Biology, Immunology and Disease (Major), Honours Bachelor of Science/ Master of Teaching
- Plant Biology (Major), Honours Bachelor of Science/ Master of Teaching

Department of Computer and Mathematical Sciences

- Mathematics (Specialist), Honours Bachelor of Science/ Master of Teaching
- Mathematics (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Mathematics (Major), Honours Bachelor of Science/ Master of Teaching
- Mathematics (Major Co-op), Honours Bachelor of Science/ Master of Teaching

Department of English

- English (Specialist), Honours Bachelor of Arts/ Master of Teaching
- English (Specialist Co-op), Honours Bachelor of Arts/ Master of Teaching
- English (Major), Honours Bachelor of Arts/ Master of Teaching
- English (Major Co-op), Honours Bachelor of Arts/ Master of Teaching

Department of Language Studies

- French (Specialist), Honours Bachelor of Arts/ Master of Teaching
- French (Specialist Co-op), Honours Bachelor of Arts/ Master of Teaching
- French (Major), Honours Bachelor of Arts/ Master of Teaching
- French (Major Co-op), Honours Bachelor of Arts/ Master of Teaching

Department of Historical and Cultural Studies

- History (Specialist), Honours Bachelor of Arts/ Master of Teaching
- History (Major), Honours Bachelor of Arts/ Master of Teaching

Department of Human Geography

- Human Geography (Specialist), Honours Bachelor of Arts/ Master of Teaching
- Human Geography (Major), Honours Bachelor of Arts/ Master of Teaching

Department of Physical and Environmental Sciences

- Biological Chemistry (Specialist), Honours Bachelor of Science/ Master of Teaching
- Biological Chemistry (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Biochemistry (Major), Honours Bachelor of Science/ Master of Teaching
- Biochemistry (Major Co-op), Honours Bachelor of Science/ Master of Teaching
- Chemistry (Specialist), Honours Bachelor of Science/ Master of Teaching
- Chemistry (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching

- Chemistry (Major), Honours Bachelor of Science/ Master of Teaching
- Chemistry (Major Co-op), Honours Bachelor of Science/ Master of Teaching
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist), Honours Bachelor of Science/ Master of Teaching
- ~~Environmental Biology~~ **Global Environmental Change** (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Environmental Chemistry (Specialist), Honours Bachelor of Science/ Master of Teaching
- Environmental Chemistry (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Environmental Physics (Specialist), Honours Bachelor of Science/ Master of Teaching
- Environmental Physics (Specialist Co-op), Honours Bachelor of Science/ Master of Teaching
- Physics and Astrophysics (Specialist), Honours Bachelor of Science/ Master of Teaching
- Physics and Astrophysics (Major), Honours Bachelor of Science/ Master of Teaching
- Physical and Mathematical Sciences (Specialist), Honours Bachelor of Science/ Master of Teaching

Department of Sociology

- Sociology (Specialist), Honours Bachelor of Arts/ Master of Teaching
- Sociology (Major), Honours Bachelor of Arts/ Master of Teaching

Students applying to the MT must have two teaching subjects regardless of the concentration they are applying to (Primary/Junior, Junior/Intermediate, or Intermediate/Senior), and must have completed at least 6.0 credits in their first teaching subject and at least 3.0 credits in their second teaching subject (note: both French as a Second Language and Science require at least 6.0 credits in university courses even when they are a second teaching subject). Each of the programs listed below includes a minimum of 6.0 credits in courses that can be applied towards the completion of the prerequisites for the identified OISE teaching subject(s).

UTSC Programs Fit With OISE MT Teaching Subjects:

UTSC Program	MT Teaching Subjects - Required Number of Courses/Credits Completed
- Specialist/ Specialist Co-op in Biological Chemistry	Science - Chemistry, or Science - Biology, or Science - General
- Specialist/Specialist Co-op in Molecular Biology and Biotechnology	Science - Biology, or Science - General
- Major/Major Co-op In Biochemistry - Major in Biology - Specialist in Conservation and Biodiversity - Major in Conservation and Biodiversity - Specialist in Human Biology - Major in Human Biology - Specialist in Integrative Biology - Major in Molecular Biology, Immunology and Disease - Major in Plant Biology	Science - Biology

UTSC Program	MT Teaching Subjects - Required Number of Courses/Credits Completed
- Specialist/Specialist Co-op in Environmental Biology Global Environmental Change	
- Specialist/Specialist Co-op in Chemistry - Major/Major Co-op in Chemistry - Specialist/Specialist Co-op in Environmental Chemistry	Science - Chemistry
- Specialist/Specialist Co-op in Environmental Physics - Specialist in Physics and Astrophysics - Major in Physics and Astrophysics - Specialist in Physical and Mathematical Sciences	Science - Physics
- Specialist/Specialist Co-op in Mathematics - Major/Major Co-op in Mathematics	Mathematics
- Specialist in Evolutionary Anthropology - Major in Evolutionary Anthropology - Specialist in Socio-Cultural Anthropology - Major in Socio-Cultural Anthropology - Specialist in Sociology - Major in Sociology	Social Science - General
- Major in Theatre and Performance Studies	Dramatic Arts
- Specialist/Specialist Co-op in English - Major/Major Co-op in English	English
- Specialist/Specialist Co-op in French - Major/Major Co-op in French	French (Second Language)
- Specialist in History - Major in History	History
- Specialist in Human Geography - Major in Human Geography	Geography

Application Process:

- Applicants must apply to the Honours Bachelor of Arts (HBA)/ Honours Bachelor of Science (HBSc) program, the MT program and the CDP.
- Qualified students in Year 3 of their HBA/ HBSc degree program apply to the MT program; those accepted will receive a conditional offer to start the MT program upon completion of their HBA/ HBSc program and degree requirements.

Minimum Admission Requirements:

To be considered for **conditional admission to the MT program and the selected CDP**, applicants must meet the following admission requirements:

- Be admitted to the HBA/ HBSc degree and at least one of the above-listed undergraduate programs at UTSC.

- Meet the admission requirements of the School of Graduate Studies and the MT program.
- Be enrolled full-time and in good standing in the HBA/ HBSc program(s):
 - have a B+ average or higher in Year 2;
 - carry a full course load of 5.0 credits each year (i.e., complete 5.0 credits over the three academic sessions - Fall, Winter, Summer); where necessary, exceptions will be made for students in Co-op programs.
- Have completed at least half of the teaching subjects' prerequisite courses - i.e., 3.0 credits in the first teaching subject and at least 1.5 credits in the second teaching subject (or 3.0 credits if the second teaching subject is French as a Second Language or Science) - by the end of Year 3.
- Provide at least two letters of reference (see: <http://www.oise.utoronto.ca/mt/Home.html>).
- Provide a Statement of Intent indicating their preferred concentration (Primary/Junior, Junior Intermediate, or Intermediate/Senior) and describe three significant teaching and/or teaching-related experiences they have had, especially with groups of children; with reference to these experiences, applicants should identify insights gained about teaching and learning, and explain how, based on these insights, they might contribute to the education of students in today's schools. On their resumé, applicants must list, in chart form, the extent of their teaching experiences; the chart should include dates, location of the experience, applicants' role, and number of hours working with students.
- Meet other qualifications as specified by the MT program, including: a police record check, relevant teaching experiences, academic and professional references, and satisfying teaching subject prerequisites.

To be given **full, unconditional admission to the MT program**, applicants must meet the following admission requirements:

- Maintain a B+ average or higher in their final year of study in the HBA/ HBSc program, or over upper-level (C- and D-level) courses.
- Achieve at least a B+ average in 1.0 credit in graduate courses taken in Year 4.
- Regardless of the concentration to which they are applying (Primary/Junior, Junior/Intermediate, Intermediate/Senior), complete the prerequisites for both the first and second teaching subjects; students are encouraged to consult often with their HBA/HBSc Program Supervisor, as well as the Combined Degree Programs Coordinator.
- Be conferred with the HBA/ HBSc degree.

Program Requirements and Path to Completion:

- Year 1 to 4: HBA/ HBSc degree requirements:
 - students must complete all of the HBA/ HBSc program and degree requirements;
 - students are expected to carry a full course load of 5.0 credits over the three academic sessions (Fall, Winter, Summer) of each year;
 - in Year 3, qualified students may apply to the MT and the CDP and may be offered conditional admission to the MT;
 - by the end of Year 3 students must complete at least 3.0 credits required for the first teaching subject, and at least 1.5 credits for the second teaching subject (or 3.0 credits if the second teaching subject is French as a Second Language or Science);

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

- in Year 4, students who receive a conditional offer of admission to the CDP must complete any two of the graduate elective half courses recommended by OISE for CDP students; these courses (1.0 credit) are counted towards the completion of both the HBA/ HBSc degree and the MT program and degree; CDP students are graded as graduate students in these courses and are required to meet graduate expectations;
- by the end of Year 4, students must complete all HBA/ HBSc program requirements and degree requirements, including at least 6.0 credits required for the first teaching subject, and at least 3.0 credits for the second teaching subject (or 6.0 credits if the second teaching subject is French as a Second Language or Science).
- Year 5 and 6: Remaining MT program and degree requirements:
 - students must complete 11.0 credits as identified by OISE.