UNIVERSITY OF TORONTO SCARBOROUGH

OFFICE OF THE CAMPUS COUNCIL

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

TO:	UTSC Academic Affairs Committee
SPONSOR:	Prof. William A. Gough, Vice-Principal Academic and Dean
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PRESENTER:	Prof. Katherine Larson: Vice-Dean Teaching, Learning & Undergraduate Programs
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DATE:	April 20, 2022 for April 27, 2022
AGENDA ITEM:	4

ITEM IDENTIFICATION:

Major Modification: New Program - Specialist (Co-op) in Conservation and Biodiversity, 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 Biological Sciences proposes to introduce a new Specialist (Co-operative) program in Conservation and Biodiversity. The Department currently offers a Specialist program in Conservation and Biodiversity, that establishes a foundation for understanding how ecology and evolution shape organismal features (from morphology and physiology to behaviour) and the structure and function of communities and ecosystems, and shows how ecological and

evolutionary perspectives can be used to understand and predict the outcome of dynamic interactions among organisms, populations, species, and communities. The proposed Specialist is the Co-operative analog to the Specialist program in Conservation and Biodiversity; as such it is fully aligned with the program requirements and learning outcomes of the existing Specialist but adds a work-integrated learning component. The program will fill a gap in the existing curriculum in species knowledge and field assessment, which is relevant for students seeking applied careers in environmental management, sustainability, conservation and policy relevant paths.

The proposed Specialist (Co-operative) will focus on the current global biodiversity crisis brought about through habitat destruction, overexploitation, biological invasions, or climate change. The program will also build on the geographic proximity of UTSC to natural ecosystems (Highland Creek Valley and Rouge Urban National Park) and leverage the close connections that already exist between departmental faculty and potential work-term employers, including the Ministry of Natural Resources (MNR), the Toronto and Region Conservation Authority (TRCA), Parks Canada, Provincial Parks, Fisheries and Oceans Canada, Toronto Zoo, and Rouge National Urban Park.

A core component of the proposed program will be a foundational 12-week work term, taken following the first year of study, in which students will hone species identification skills (fishes and plants) utilize relevant field-assessment methods, and build on a multi-year database as research assistants. Students will contribute to a long-term biodiversity monitoring data set, which will be relevant to core research of Department faculty members and form a backbone to long-term monitoring of the ecological condition of Highland Creek Valley and Rouge Urban National Park. Based on this experience, students will be ideally placed to be successful in subsequent work terms.

The proposed Specialist (Co-operative) has been developed in close consultation with the Arts & Science Co-op office, and in consultation with current students of the Specialist in Conservation in Biodiversity. Student interest in this program aligns with planning recommendations from the most recent external review of the Department and its programs, conducted in 2019-20. In their report, reviewers recommended that the Department explore the development of a Conservation and Biodiversity Co-op program.

Graduates of the program will be well positioned to pursue a Master' in Environmental Science (MEnvSc), as well as careers in government agencies, consulting firms or NGOs, careers in business or law related to environmental issues, stewardship and sustainable development, or continue with graduate studies in science for academic careers.

FINANCIAL IMPLICATIONS:

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

RECOMMENDATION:

Be It Resolved,

THAT the Specialist program (Co-operative) in Conservation and Biodiversity, proposed by the Department of Biological Sciences, as described in the proposal dated April 11, 2022, be approved, effective September 1, 2022.

DOCUMENTATION PROVIDED:

1. Proposal: Major Modification: New Program - Specialist/Specialist (Co-op) in Conservation and Biodiversity dated April 11, 2022.

University of Toronto
Major Modification Proposal:

Specialist or Major Where There is an Existing Major or Specialist

This template should be used to bring forward all proposals for major modifications of this type for governance approval under the University of Toronto's Quality Assurance Process.

What is being proposed: please specify exactly what is being proposed; e.g., a specialist or major where there is an existing major or specialist	Specialist (Co-operative) program in Conservation and Biodiversity (Honours Bachelor of Science) *New program where a Specialist program in Conservation and Biodiversity already exists.
Department/unit (if applicable):	Department of Biological Sciences
Faculty/academic division:	University of Toronto Scarborough (UTSC)
Dean's office contact:	Martha Harris, Academic Programs Officer, martha.harris@utoronto.ca
Proponents:	Ivana Stehlik, Associate Professor, Teaching Stream Aarthi Ashok, Professor, Teaching Stream & Associate Chair Undergraduate Affairs & Technical Staff
Version date: please change as you edit this proposal.	April 11, 2022

1 Summary

- Please provide a brief summary of what is being proposed, including a clear statement of the relationship of this to the existing specialist or major and the impetus behind the proposal.

This is a proposal to introduce a new Specialist (Co-operative) program in Conservation and Biodiversity where a Specialist program in Conservation and Biodiversity already exists.

As with the Specialist program in Conservation and Biodiversity, the proposed Specialist (Co-operative) program in Conservation and Biodiversity will lead to an

Honours Bachelor of Science (H.BSc.) degree, and will be housed in, and administered by, the Department of Biological Sciences at the University of Toronto Scarborough (UTSC).

The Department of Biological Sciences at UTSC is recognized for the strength of its biology programs, including:

- Specialist/Specialist (Co-operative) programs in Molecular Biology and Biotechnology (H.BSc.)
- Specialist and Major programs in Human Biology (H.BSc.)
- Specialist program in Integrative Biology (H.BSc.)
- Specialist program in Molecular Biology and Biotechnology (H.BSc.)
- Major program in Molecular Biology, Immunology and Disease (H.BSc.)
- Major program in Plant Biology (H.BSc.)
- Minor in Biology (Science)

To support these programs, the Department of Biological Sciences offers courses in the main sub-fields of biology, including Conservation and Biodiversity; Human Biology; Integrative Biology; Molecular Biology and Biotechnology; Molecular Biology, Immunology and Disease; and Plant Biology.

The existing Specialist program in Conservation and Biodiversity is a limited enrolment program that establishes a foundation for understanding how ecology and evolution shape organismal features (from morphology and physiology to behaviour) and the structure and function of communities and ecosystems, and shows how ecological and evolutionary perspectives can be used to understand and predict the outcome of dynamic interactions among organisms, populations, species, and communities. It examines the daunting challenges to biodiversity. Habitat destruction, biological invasions and climate change are causing loss of species and disruption of ecosystems worldwide. Students are trained to understand and actively seek solutions to these problems, and are well prepared to take positions in government agencies, consulting firms or NGO's, pursue careers in business or law related to environmental issues, stewardship and sustainable development, or continue on to graduate studies in science for academic careers. Compared to other programs in the Department, enrolments in the Specialist are modest: 7 students in 2015-16, 6 in 2016-17, 8 in 2017-18, 6 in 2018-19, 8 in 2019-20, and 7 in 2020-21.

The proposed Specialist program is the Co-operative analog to the Specialist program in Conservation and Biodiversity; as such it is fully aligned with the program requirements and learning outcomes of the existing Specialist but, as is true for other Co-operative programs, it adds a work-integrated learning component that supports a framework for how ecology and evolution shape organismal biodiversity on earth, and the factors that determine it, along with the structure and function of communities and ecosystems. The proposed Specialist (Co-operative) program will

focus on the current global biodiversity crisis brought about through habitat destruction, overexploitation, biological invasions, or climate change. Graduates of the program will be able to actively seek solutions to these problems; to apply ecological and evolutionary perspectives to understand, predict and mitigate the negative outcomes on dynamic interactions among organisms, populations, species, and communities, under changing global conditions.

A core component of the Co-op requirements of the proposed program is a 12-week (420 work hours) paid foundational work term, that students will undertake following their first year of study (a proposal for COPB36H3 - Biodiversity and its Field Assessment is being developed concurrently with this major modification proposal). In this work term, students will have the opportunity to hone species identification skills (fishes and plants) utilize relevant field-assessment methods, and build on a multi-year database as research assistants. With the experience gained during this first work term, students will be ideally placed to be successful in subsequent work terms, which will be competitive, as is the norm for Co-op work terms.

The proposed Specialist (Co-operative) program will build on the geographic proximity of UTSC to natural ecosystems (Highland Creek Valley and Rouge Urban National Park) and leverage the close connections that already exist between departmental faculty and potential work-term employers, including the Ministry of Natural Resources (MNR), the Toronto and Region Conservation Authority (TRCA), Parks Canada, Provincial Parks, Fisheries and Oceans Canada, Toronto Zoo, and Rouge National Urban Park. It will also successfully allow students to take positions in government agencies, consulting firms or NGOs; to continue with graduate studies in science for academic careers; or to pursue careers in business or law related to environmental issues, stewardship and sustainable development.

The non Co-op version of the program will remain a valuable academic experience for students interested in pursuing graduate studies in the areas of conservation, sustainability, environmental policy and biodiversity related research areas. Academic preparation for such students would not require applied work terms such as the ones proposed here for the new Co-op based version of the program. Hence, we see value in retaining both Co-op and non Co-op versions of our Conservation and Biodiversity Specialist Program.

In support of the proposed program, and with the goal of expanding access, the Department of Biological Sciences will be exploring opportunities to develop Combined Degree Programs with the Master of Environmental Science, as well as facilitated transfer pathways with interested Ontario Colleges.

2 Effective Date

Fall 2022, for the 2022-23 academic year.

3 Academic Rationale

- What are the academic reasons for the new major or specialist being proposed, and how does this fit with the unit's and division's academic plans?

The existing Specialist program in Conservation and Biodiversity focuses on the ecology and evolutionary biology of organismal diversity and the structure and function of communities and ecosystems. The program is designed to illustrate how ecological and evolutionary perspectives can be used to understand and predict the outcome of dynamic interactions among organisms, populations, species, and communities. Graduates of the program should be able to understand and actively seek solutions to problems such as habitat destruction, biological invasions and climate change, which result in loss of species and disruption of ecosystems worldwide. Graduates should also be well-placed to take positions in government agencies, consulting firms or NGOs, careers in business or law related to environmental issues, stewardship and sustainable development, or continue with graduate studies in science for academic careers.

Following an extensive curriculum mapping exercise, the Department of Biological Sciences has identified a gap in the existing Specialist program in species knowledge and their applied field assessment, for students who are interested in seeking applied careers in environmental management, sustainability, conservation and policy-relevant paths. We envision this Co-op program to be an applied version of the current non Co-op program; the existing program would still serve students seeking to explore more fundamental, academic careers in these fields.

The proposed Specialist (Co-operative) analog program will address this gap by including an increased focus on courses on plants and fish species identification, and the development of practical knowledge of conservation and biodiversity subjects through the completion of three Co-op work terms. In particular, in their first work-term, when students complete COPB36H3, they will learn plant and fish identification and how to assess their respective diversities in the field, as they gather data as research assistants, and contribute to a departmental multi-year database.

The proposed program supports the following elements of UTSC's Strategic Plan, *Inspiring Inclusive Excellence* (2020-2025):

1. Strategic Direction 1.1: Provide all students with transformative, experiential, and holistic curricular, co-curricular, and extra-curricular learning opportunities;

This strategic direction is explicitly supported through the first Co-op work term, via COPB36H3. UTSC is positioned in close proximity to environmentally important components of GTA's green lungs (Highland Creek valley and Rouge Urban National Park), allowing for the effective teaching of field-based species identification and assessment of local biodiversity within short commuting distance from the UTSC campus. The work in this course toward learning outcomes in identifying fishes and plants will position students well for future work in the field after graduation. The Highland Creek valley and the Rouge Urban National Park, with their high levels of diversity in these two taxonomic groups, are ideal settings for COPB36H3. The first part of the work-term will be spent familiarizing students with major taxonomic groups within fishes and plants and how to identify the species, while in the latter part, students will work on assembling a long-term biodiversity monitoring data set, located in the Rouge Urban National Park and/or Highland Creek valley. This inventory will be designed to be relevant to core research done by faculty within the Department of Biological Sciences and will form a backbone to long-term monitoring of the ecological condition of these two green lungs within the GTA.

2. 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.

The proposed program will provide students with essential biodiversity identification and field-based assessments skills which are essential for future professionals working in areas such as conservation, remediation and environmental management in a world facing the current and future challenges of the manmade biodiversity crisis. The need to develop these skills has been recognized by faculty and students alike but has been largely limited by lack of coursework in the summer months when such field-based teaching must occur. COPB36H3 addresses this gap in the existing non Co-op Specialist program, and as such it will be particularly important for students who will seek work terms with local conservation authorities and other potential employers.

The proposed program is ideally positioned to provide a pathway to the Professional Masters in Environmental Science (MEnvSc), and an appropriate Undergraduate/Graduate Combined Degree Program with the MEnvSc is currently under discussion with the Graduate Department of Physical and Environmental Sciences. It may also be attractive to students in Ontario colleges who are completing diplomas (e.g., ecosystem restoration, fish and wildlife technician, environmental technician, etc.), and who also want to complete a bachelor's degree. We will be

exploring opportunities to develop facilitated transfer pathways with interested Colleges.

4 Need and Demand

- Provide a brief description of the need and demand for the new specialist or major focusing, as appropriate, on student interest, societal need, employment opportunities for prospective graduates, accreditation requirements, etc.

Student Interest:
In the fall of 2019, the Department of Biological Sciences surveyed students enrolled in the Specialist and Major programs in Conservation and Biodiversity to gauge their interest in a Specialist (Co-operative) program in Conservation and Biodiversity. 90 percent of respondents answered that they would have chosen the Co-op version of the Specialist in Conservation and Biodiversity, had it been available to them.

Student interest in this program aligns with planning recommendations from the most recent external review of the Department and its programs, conducted in 2019-20. In their report, reviewers recommended that the Department explore the development of a Conservation and Biodiversity Co-op program. This was further acknowledged and supported in the Administrative Response and Final Assessment Report and Implementation Plan, which were reported to the Committee on Academic Planning and Programs on October 21, 2021.

Societal Need:
The world currently faces joint biodiversity and global change crises, in both terrestrial and aquatic ecosystems. To mitigate these human effects on natural ecosystems, but also for safeguarding human livelihoods in terms of food production (soils, pollination), access to clean water and air, and for mitigation of climatic catastrophes, the demand for well-trained graduates to contribute towards a more sustainable future and to actively seek solutions to these problems will only increase (Eco-Canada Conservation' labor study (2021); https://eco.ca/new-reports/the-growing-nature-conservation-workforce-reducing-canadas-footprint/). Employers that currently recruit students who complete the field in Conservation & Biodiversity of the professional Master in Environmental Science (MEnvSc) note that biodiversity identification and field-assessment skills (in particular for fish, amphibians/reptiles and plants) are highly desirable competencies in students seeking internships and postgraduate employment. To better prepare undergraduate students to meet this employer need, the proposed program will include a 12-week work-term (COPB36H3) that will focus on fishes and plants.

Following a meeting with the Arts and Science Co-op Office, the Department has identified the following employment opportunities for graduates of the proposed program:
- Field research assistants
- Lab research assistants
- Data analysts
- Editorial boards of scientific journals
- Community outreach
- Guides/interpreters
- Administrative assistants
- Animal or plant care

In addition, the following potential employers have been identified:
- Parks Canada or provincial parks
- Fisheries and Oceans Canada
- Environment and Climate Change Canada
- Ministry of Natural Resources and Forests
-The Toronto Zoo
- Toronto and Region Conservation Authority
- Government at various levels
- Non-governmental conservation agencies such as Greenpeace, World Wildlife Fund Parks Canada, Ontario Nature, Bioforest (https://bioforest.ca/), Agriculture Canada

5 Admission/Eligibility Requirements

- Describe any specific requirements that students must meet to be eligible for this specialist/major and how these will be administered. How do these differ from the requirements of the existing specialist or major?

The proposed program will be limited enrolment. Students will be able to apply after completing 4.0 credits, including the following courses: BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, [MATA29H3 or MATA30H3 or MATA35H3 or MATA36H3], and they must have a cumulative GPA of at least 2.75.

Current Co-op Students:
Students admitted to a Co-op Degree Program in their first year of study (i.e. Life Sciences Co-op) may request this Co-op Subject POSt on ACORN only after completion of 4.0 credits; in addition, students must meet the minimum enrolment requirements for entry as noted above for this program.

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.

6 Program Requirements

- Please provide a full calendar entry including all required courses, recommended electives and their prerequisites.

Proposed Calendar Copy

SPECIALIST (CO-OPERATIVE) PROGRAM IN CONSERVATION AND BIODIVIERSITY (SCIENCE)

This program presents a foundation for understanding how ecology and evolution shape organismal features (from morphology and physiology to behaviour), and the structure and function of communities and ecosystems. These processes determine the broad patterns of organization of life on earth and biodiversity, and the challenges to biodiversity are daunting: habitat destruction, biological invasions and climate change are causing loss of species and disruption of ecosystems worldwide. In this program, students are trained to understand and actively seek solutions to these problems. This program will also show how ecological and evolutionary perspectives can be used to understand and predict the outcome of dynamic interactions among organisms, populations, species, and communities, Graduates will be well trained to take on positions in government agencies, consulting firms or NGO's, to pursue careers in business or law related to environmental issues, stewardship and sustainable development, or to continue with graduate studies in science for academic careers.

The co-op option of the Conservation and Biodiversity program complements and punctuates academic course work with full-time work terms in the various governmental or non-governmental conservation agencies, in labs or in public or private industry. These placements help students define and refine their career and/or professional school goals. For information on admissions, fees, work terms and standing in the Program, please see section 6B.5 (Co-operative Programs) or the Arts and Science Co-op section in this Calendar.

Enrolment Requirements
Enrolment in the program is limited. Students may apply to enter the program after completing 4.0 credits, which must include the following courses: BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, and [MATA29H3 or MATA30H3 or MATA35H3 or MATA36H3]; students must also have achieved a cumulative GPA of at least 2.75.

Students must also submit a formal application to the department to be considered for the program. This includes a one-page statement for why they are suitable candidates to take the program. Short-listed students will be invited to an oral interview to determine interest and eligibility.

Current Co-op Students:
Students admitted to a Co-op Degree Program in their first year of study (i.e. Life Sciences Co-op) may request this Co-op Subject POSt on ACORN only after completion of 4.0 credits; in addition, students must meet the minimum enrolment requirements for entry as noted above for this program.

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
The program requires students to complete a total of 14.5 credits.

A. Required Courses

First Year
1. 1.0 Credit of Introductory Biology Courses
BIOA01H3 Life on Earth: Unifying Principles
BIOA02H3 Life on Earth: Form, Function and Interactions

2. 1.0 Credit of Introductory Chemistry Courses
CHMA10H3 Introductory Chemistry I: Structure and Bonding
CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms

3. 1.0 Credit in Mathematics
Choose from:
[MATA29H3 Calculus I for the Life Sciences and MATA35H3 Calculus II for Biological Sciences] or
[MATA30H3 Calculus I for Physical Sciences and MATA36H3 Calculus II for Physical Sciences]

4. 0.5 Credit in Physics
Choose from:
PHYA10H3 Physics I for the Physical Sciences
PHYA11H3 Physics I for the Life Sciences

5. 0.5 Credit in Computer Science
Choose from:
CSCA08H3 Introduction to Computer Science I (most appropriate course for computer science students)
CSCA20H3 Introduction to Programming (most appropriate course for non-computer science students)

Second Year

6. 3.0 Credits of Biology Core Courses
BIOB10H3 Cell Biology
BIOB11H3 Molecular Aspects of Cellular and Genetic Processes
BIOB34H3 Animal Physiology
BIOB38H3 Plants and Society
BIOB50H3 Ecology
BIOB51H3 Evolutionary Biology
BIOB90H3 Integrative Research Poster Project (CR/NCR 0.0 credit)*

*__Note__: Completion of BIOB90H3 is a graduation requirement for students in this program. Concurrent enrolment in at least one of the BIO B-level courses listed above is required for enrolment in BIOB90H3. Please see BIOB90H3 in the Calendar for important information.

7. 0.5 Credit of Biology Core Labs
BIOB52H3 Ecology and Evolutionary Biology Laboratory

8. 0.5 Credit in Statistics
Choose from:
STAB22H3 Statistics I
PSYB07H3 Data Analysis in Psychology

Third Year

9. 2.5 Credits of C-level Ecology and Evolution Foundation Courses
BIOC16H3 Evolutionary Genetics and Genomics
BIOC50H3 Macroevolution
BIOC52H3 Field Ecology
BIOC61H3 Community Ecology and Environmental Biology
BIOC63H3 Conservation Biology

Third/Fourth Year

10. 4.0 credits of C- & D-level courses from Bins 1 and 2 below. This must include at least 1.0 credit from each bin and at least 1.0 credit total at the D-level.

Bin 1: C- & D-level Ecology and Evolution Courses
Choose from:
BIOC29H3 Introductory Mycology
BIOC51H3 Tropical Biodiversity Field Course
BIOC58H3 Biological Consequences of Global Change
BIOC60H3 Winter Ecology
BIOC65H3 Environmental Toxicology
BIOD25H3 Genomics
BIOD52H3 Biodiversity and Conservation
BIOD54H3 Applied Conservation Biology
BIOD55H3 Experimental Animal Behaviour
BIOD59H3 Models in Ecology, Epidemiology and Conservation
BIOD60H3 Spatial Ecology
BIOD62H3 Symbiosis: Interactions Between Species
BIOD63H3 From Individuals to Ecosystems: Advanced Topics in Ecology
BIOD66H3 Causes and Consequences of Biodiversity
BIOD67H3 Inter-University Biology Field Course
EESC04H3 Biodiversity and Biogeography

Bin 2: C- & D-level Organismal Biology Courses
Choose from:
BIOC37H3 Plants: Life on the Edge
BIOC40H3 Plant Physiology
BIOC54H3 Animal Behaviour
BIOC59H3 Advanced Population Ecology
BIOC62H3 Role of Zoos and Aquariums in Conservation
BIOD26H3 Fungal Biology & Pathogenesis
BIOD34H3 Conservation Physiology
BIOD37H3 Biology of Plant Stress
BIOD43H3 Animal Movement and Exercise
BIOD45H3 Animal Communication
BIOD48H3 Ornithology
BIOD53H3 Special Topics in Animal Behaviour
EESC30H3 Environmental Microbiology
BIOC90H3 Integrative Multimedia Documentary Project (CR/NCR 0.0 credit)*

***Note**: Completion of BIOC90H3 is a graduation requirement for students in this program. Concurrent enrolment in one of the participating BIO C-level courses is required for enrolment in BIOC90H3. Please see BIOC90H3 in the Calendar for important information.

B. Senior Research Courses (optional)
Students interested in graduate research are encouraged to take one or more of the independent research courses offered in Biological Sciences as part of their degree.
BIOD95H3 Supervised Study in Biology
BIOD98Y3 Directed Research in Biology
BIOD99Y3 Directed Research in Biology

Co-op Work Term Requirements
Students must satisfactorily complete three Co-op work terms, one of 12-weeks and two of four-months duration.

1. To be eligible for the first work term (COPB36H3), students must be enrolled in the Specialist (Co-operative) program in Conservation and Biodiversity.

2. To be eligible for the second and third work terms (COPC36H3), students must have completed at least 10.0 credits, including BIOB50H3 and BIOB51H3.

In addition to their academic program requirements, Co-op students complete up to four 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- 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.
3. COPB52H3/(COPD11H3) – Managing your Work Term Search & Transition to Work
4. 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. The first work term must occur in the summer; the second and third work terms could take place in Summer, Fall, Winter terms. This, in turn, may require 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 Section 6B.5 or the Arts and Science Co-op section in the UTSC *Calendar*.

- Please describe in your own words how the requirements for the major or specialist compare to the requirements of the existing specialist or major.

Explanation of the Proposed Requirements

Enrolment Requirements

The enrolment requirements for the proposed Specialist (Co-operative) program in Conservation and Biodiversity are aligned with those of the existing non Co-op Specialist program, in the following ways:

- Enrolment is limited;
- Students apply to the program after completing 4.0 credits;

The enrolment requirements for the proposed program differ from the existing program in the following ways:

- In the existing program, the 4.0 credits students complete before they can apply to the program must include the following: 1.0 credit in Biology (excluding BIOA11H3), 1.0 credit in Chemistry, and 0.5 credit in Mathematics (excluding MATA02H3) or Statistics; in the proposed program, the 4.0 credits students complete before they apply to the program must include the following: BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, and [MATA29H3 or MATA30H3 or MATA35H3 or MATA36H3].
- In the existing program, students must have a minimum CGPA of 2.0 to apply; in the proposed program, students must have a minimum CGPA of 2.75 to apply. The minimum CGPA to be accepted into any Arts and Science Co-op programs at UTSC is 2.5. This minimum CGPA for the proposed program is 2.75 – which is slightly higher - because of the increased need to select high-caliber students with a strong academic foundation in core concepts that a research-intensive first work term would rely on and an excellent work ethic given the high academic demands associated with the first work term (COPB36H3) of the proposed program.
- In the proposed Co-op Specialist, students will be required to submit a written statement of interest to pursue this applied program (1-page maximum); based on the written statements, short-listed students will be invited to 15-minute interviews to determine interest and eligibility. These additional

requirements will ensure enrolment meets the limited capacity for the Co-op Specialist.

Program Requirements

The program course requirements for the proposed Specialist (Co-operative) program are the same as those for the existing Specialist program, except as follows:

- BIOC29H3 Introductory Mycology, has been added to component 10, Bin 1. This change is because BIOC29H3 is a new course offering which ideally complements the nature of courses in the Ecology and Evolution bin; the students will gain an understanding of the diversity within the fungal kingdom, which is an important area of study that is currently not available to students.

Co-op Requirements

The Co-op requirements for the proposed Specialist (Co-operative) program are new. As is true for other Arts and Science Co-op programs at UTSC, students in the proposed program must complete three work terms. The first work-term (COPB36H3) will be 12-weeks (420 hours) and will be take place in the Summer term, after students have completed their first 4.0 credits.

The second and third work-terms (COPC36H3) will be at least 4-months in length, and will be taken following Years 2 and 3 of the program, along with all required work-term prep courses. Through their work terms, and in particular through their first work term, students will have the opportunity to utilize and develop their biodiversity identification and field-based assessments skills. These skills are essential for future professionals that will work in areas such as conservation, remediation and environmental management. With the addition of this experiential and work-integrated learning component the proposed program will be unique within the landscape of other Conservation and Biodiversity programs (within and outside the province) and will be attractive to students. At the same time, it will ensure that UTSC students are more competitive compared to students in other Co-op programs, since the first work-term takes place early in the program, and is focused on key skills development.

Students will have two planning options to complete Co-op and Work Terms in sequence with their study terms:

Option 1:

Year	Fall	Winter	Summer
1	Study	Study	admitted & Work Term (WT)1
2	study & COPB51	Study & COPB52	WT2

3	Study & COPC99	WT3	Study
4	Study	Study	Graduate

Option 2:

Year	Fall	Winter	Summer
1	Study	Study	admitted & WT1
2	study	Study & COPB51	Study & COPB52
3	WT 2	Study/COPC99	WT3
4	Study	Study	Graduate

Avenues for Students Who Leave the Co-op Program

Status in an Arts & Science Co-op program is determined at the end of each session (Fall, Winter, and Summer) for students who have attempted at least 3.0 credits since beginning their studies at UTSC, or in other Arts and Sciences Divisions at the University. Students with a cumulative grade point average (CGPA) of 2.5 or higher are considered to be in good standing.

- Students whose CGPA falls below 2.5 will be placed on probation.
- Students may clear probation by achieving a CGPA of 2.5 or better in the next study session. Where the CGPA is below 2.5, but the sessional grade point average (SGPA) is at least 2.5 but above 2.3, students may be granted a second probationary semester.
- Students must clear their probation within a maximum of two study sessions in order to remain in a Co-op program.
- Students on probation in the Co-op program may not apply for a work-term until they have successfully cleared their probation. However, if a student's CGPA falls below 2.5 after having secured a co-op work-term through the recruitment process, the student will be permitted to complete the work term but must clear probation before being permitted to participate in the next recruitment process.
- Students whose CGPA falls below 2.3 will be removed from the Co-op program.

Students that are removed from the proposed program, or who decide that they do not want to continue in the Co-op Specialist, will be well placed to be able to transfer to the non Co-op Specialist in Conservation and Biodiversity due to the strong alignment in the programs.

7 Program Structure, Learning Outcomes and Degree-Level Expectations

- It is assumed that the learning outcomes will not be new for the specialist or major; that being said, describe here how the learning outcomes for the proposed specialist or major will extend or contract the learning outcomes for the existing major or specialist.

The learning outcomes for the existing Specialist program in Conservation and Biodiversity, are articulated in the Department's most recent self-study (February, 2020). Upon completion of the program, students will be able to:

- Describe the different conservation strategies used in protecting species, and maintaining or restoring ecosystem services.
- Formulate how evolution by natural selection helps explain the diversity of life on earth, both extant and extinct, and develop an appreciation for the natural world.
- Evaluate the role of species interactions in shaping communities.
- Formulate how natural and anthropogenic drivers shape global climate.
- Discuss the intrinsic and extrinsic values of biodiversity, and identify essential ecosystem services.
- Describe how energy and matter enter and are transferred through ecosystems.
- Dissect how interactions across time, space and scales influences biodiversity.
- Demonstrate species knowledge of (local) biodiversity.

The learning outcomes for the proposed Specialist (Co-operative) program in Conservation and Biodiversity will be the same as those for the existing program, however, the Co-op requirements will add the following learning outcomes:

- Application of Knowledge: Students will be able to recognize the most common fish and plant species in southern Ontario based on taxonomically relevant character traits
- Knowledge of Methodologies: Students will be able to use dichotomous identification keys in the 'ROM Field Guide to the Freshwater Fishes of Ontario' and 'An Atlas of the Freshwater Fishes of Canada' annotated with 'An Illustrated Identification Key' designed to highlight the key identification features of Ontario's fish families and selected species.
- Knowledge of Methodologies: Students will be able to use the dichotomous identification keys in 'The Plants of Southern Ontario' and 'Trees in Canada' designed to highlight the key identification features of Ontario's plant families, genera and selected species.
- Knowledge of Methodologies: Students will be able to choose the correct plot size and plot distribution in terrestrial ecosystems to assess plant diversity in the field, based on whether the emphasis is to assess diversity of herbs or woody species in grasslands, old-fields or wooded habitats.

- Autonomy and Professional Capacity: Students will gain the certification of Class II Electrofishing.

The learning outcomes for the proposed Specialist (Co-operative) program in Conservation and Biodiversity will include the learning outcomes associated with the Co-op Preparation courses (COPB50H3, COPB51H3, COPB52H3, COPC98H3, COPC99H3):

- Set and attain personal and professional learning goals using the SMART goal framework - Apply and develop their knowledge and skills by being immersed full time in a work place setting
- Transition successfully from university to the workplace
- Begin to understand how to manage common workplace situations and dynamics
- Contribute positively in a professional environment, working independently and as part of a team
- Develop and communicate ideas and well-reasoned arguments in writing and orally
- Receive, reflect upon and incorporate feedback on work performance for continuous improvement and development
- Create an effective Portfolio to showcase skills, knowledge and experienced used or developed on work term to be used in future co-op work term search or job search activities

8 Consultation

- Describe any consultation with programs and units that may be affected within and outside the unit and Faculty/division.

Within the Department of Biological Sciences:

This proposal is the culmination of numerous discussions within the Department of Biological Sciences. The departmental curriculum committee met to discuss this proposal on June 22, 2021 and June 29, 2021. It was also presented to the department for comments and review in August, 2021.

At UTSC:

There has been extensive consultation with the Arts and Science Co-op Office at UTSC, starting with informal discussions in April 2019, more formal discussions on Feb 5th 2021, June 7th, 2021, and again on August 18, 2021, and follow-up online

consultations/conversations involving Susan Soikie, Cynthia Jairam and Alison Kuepper from the Arts and Science Co-op office, and Andrew Mason, Ivana Stehlik, Aarthi Ashok, and Nicholas Mandrak from the Department of Biological Sciences.

9 Resources

- Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries, and enrolment/admissions.
- Please specify 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 and staff who are currently associated with the Specialist and Major programs in Conservation and Biodiversity will support the proposed program, including faculty members listed below. The proposed Specialist (Co-operative) program in Conservation and Biodiversity will not impact overall enrolments at UTSC; however, there may be some shifting of enrolments at the program level within the Department of Biological Sciences.

Resourcing needed for the new course COPB36H3 will entail one TA (105 hours) and one instructor (a full-time faculty member will be assigned, or a sessional instructor will be hired based on annual discussions with the Chair of the department).

- No additional equipment or infrastructure support is needed
- No ancillary or laboratory fees
- Use of existing co-op resources for co-op components

The cost for each student to be hired into COPB36H3 would be: $15 x 420 hours = $6300. The total of 5 students for the first cohort will require $31,500. Dean Gough and Dr. Kenneth Welch (Acting Chair, Department of Biological Sciences) have agreed to split this total cost for launching of the first 2 years of this program.

The proposed program does not currently affect any existing agreements, but should that change in the future the appropriate processes will be followed.

Table 1: List of Biological Sciences Faculty, 2021/22

Faculty Member	Rank	Unit of Primary Appointment	Courses Taught (2021-22)
Cadotte, M	Tenure Stream - Professor	Department of Biological Sciences	BIOD60H3F
Lovejoy, N	Tenure Stream - Professor	Department of Biological Sciences	BIOB52H3F; BIOC51H3Y (Summer 2022)
MacIvor, S	Tenure Stream – Assistant Professor	Department of Biological Sciences	BIOA01H3F; BIOD54H3S
Mandrak, N	Tenure Stream - Professor	Department of Biological Sciences	nothing in bio
Molnar, P	Tenure Stream – Assistant Professor	Department of Biological Sciences	BIOB50H3F; BIOD59H3F
Stehlik, I	Teaching stream – Associate Professor	Department of Biological Sciences	BIOA02H3S; BIOB38H3S BIOC37H3F; BIOC52H3F; BIOC60H3S BIOD95/98/99
Sturge, R	Teaching stream – Associate Professor	Department of Biological Sciences	BIOA02H3S; BIOA02H3Y (Summer); BIOC58H3F; BIOC61H3F; BIOC63H3F; BIOC62H3S; BIOC90H3F and S; BIOD63H3S
Wang, Y	Tenure Stream – Assistant Professor	Department of Biological Sciences	BIOA01H3F
Weir, J	Tenure Stream - Professor	Department of Biological Sciences	BIOC50H3F; (on leave in the fall)

Faculty Requirements

- Will the establishment of the new major or specialist have any effect on the faculty complement? You may wish to comment on the role of any adjunct faculty; provision of supervision of experiential learning opportunities as appropriate.

The program will require a faculty supervisor; this role will be assigned to Dr. Ivana Stehlik as part of her departmental service assignment. Support with the student selection (screening of the applications, help with the logistics of the interview process) will be provided by administrative staff of the Department of Biological Sciences. The Arts and Science Co-op Office will provide support to students for all work term relevant preparation and requirements.

Space/Infrastructure

- Address any **additional** unique space/infrastructure requirements including information technology, laboratory space and equipment, etc.

No additional needs.

10 UTSC Administrative Steps

Administrative Steps Required	Date
Departmental Curriculum Committee	September 10, 2021
Dean's Office Green Light	August 18, 2021

11 UTQAP Process

Levels of Approval Required	Date
• **Decanal Sign-Off** • **Provost Office Sign-Off**	• February 24, 2022 • March 10, 2022
UTSC Academic Affairs Committee	April 27, 2022
Submission to Provost's Office	
AP&P – reported annually	
Ontario Quality Council – reported annually	

12 Appendix A: Calendar Copy for Specialist in Conservation and Biodiversity

Description

This program presents a foundation for understanding how ecology and evolution shape organismal features (from morphology and physiology to behaviour) and the structure and function of communities and ecosystems. Ultimately these processes determine the broad patterns of organization of life on earth and biodiversity. The challenges to biodiversity are daunting. Habitat destruction, biological invasions and climate change are causing loss of species and disruption of ecosystems worldwide. Graduates are trained to understand and actively seek solutions to these problems. This program will show how ecological and evolutionary perspectives can be used to understand and predict the outcome of dynamic interactions among organisms, populations, species, and communities. Students will be well trained to take positions in government agencies, consulting firms or NGO's, able to continue with graduate studies in science for academic careers, or able to pursue careers in business or law related to environmental issues, stewardship and sustainable development.

Note: This program was formerly known as the Specialist in Biodiversity, Ecology & Evolution (BSc).

Enrolment Requirements

Students apply to the Specialist Program in Conservation and Biodiversity after completing a minimum of 4.0 credits, including 1.0 credit in Biology (excluding BIOA11H3), 1.0 credit in Chemistry, and 0.5 credit in Mathematics (excluding MATA02H3) or Statistics and with a minimum cumulative grade point average (CGPA) of at least 2.0.

Application for admission is made to the Office of the Registrar through ACORN, in April/May and July/August. See the UTSC Office of the Registrar's website for more information on program selection.

Program Requirements

This program consists of 14.5 required credits.

A. Required Courses

First Year
1. 1.0 Credit of Introductory Biology Courses

BIOA01H3 Life on Earth: Unifying Principles
BIOA02H3 Life on Earth: Form, Function and Interactions

2. 1.0 Credit of Introductory Chemistry Courses
CHMA10H3 Introductory Chemistry I: Structure and Bonding
CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms

3. 1.0 Credit in Mathematics
Choose from:
[MATA29H3 Calculus I for the Life Sciences and MATA35H3 Calculus II for Biological Sciences] or
[MATA30H3 Calculus I for Physical Sciences and MATA36H3 Calculus II for Physical Sciences]

4. 0.5 Credit in Physics
Choose from:
PHYA10H3 Physics I for the Physical Sciences
PHYA11H3 Physics I for the Life Sciences

5. 0.5 Credit in Computer Science
Choose from:
CSCA08H3 Introduction to Computer Science I (most appropriate course for computer science students)
CSCA20H3 Introduction to Programming (most appropriate course for non-computer science students)

Second Year
6. 3.0 Credits of Biology Core Courses
BIOB10H3 Cell Biology
BIOB11H3 Molecular Aspects of Cellular and Genetic Processes
BIOB34H3 Animal Physiology
BIOB38H3 Plants and Society
BIOB50H3 Ecology
BIOB51H3 Evolutionary Biology

BIOB90H3 Integrative Research Poster Project (CR/NCR 0.0 credit)*
*Note: Completion of BIOB90H3 is a graduation requirement for students in this program. Concurrent enrolment in at least one of the BIO B-level courses listed above is required for enrolment in BIOB90H3. Please see BIOB90H3 in the Calendar for important information.

7. 0.5 Credit of Biology Core Labs
BIOB52H3 Ecology and Evolutionary Biology Laboratory

8. 0.5 Credit in Statistics
Choose from:
STAB22H3 Statistics I
PSYB07H3 Data Analysis in Psychology

Third Year
9. 2.5 Credits of C-level Ecology and Evolution Foundation Courses
BIOC16H3 Evolutionary Genetics and Genomics
BIOC50H3 Macroevolution
BIOC52H3 Field Ecology
BIOC61H3 Community Ecology and Environmental Biology
BIOC63H3 Conservation Biology

Third/Fourth Year
10. 4.0 credits of C- & D-level courses from Bins 1 and 2 below. This must include at least 1.0 credit from each bin and at least 1.0 credit total at the D-level.

Bin 1: C- & D-level Ecology and Evolution Courses
Choose from:
BIOC51H3 Tropical Biodiversity Field Course
BIOC58H3 Biological Consequences of Global Change
BIOC60H3 Winter Ecology
BIOC65H3 Environmental Toxicology
(BIOC67H3) Inter-University Biology Field Course
BIOD25H3 Genomics
BIOD52H3 Biodiversity and Conservation
BIOD54H3 Applied Conservation Biology
BIOD55H3 Experimental Animal Behaviour
BIOD59H3 Models in Ecology, Epidemiology and Conservation
BIOD60H3 Spatial Ecology
BIOD62H3 Symbiosis: Interactions Between Species
BIOD63H3 From Individuals to Ecosystems: Advanced Topics in Ecology
BIOD66H3 Causes and Consequences of Biodiversity
BIOD67H3 Inter-University Biology Field Course
EESC04H3 Biodiversity and Biogeography

Bin 2: C- & D-level Organismal Biology Courses
Choose from:
BIOC37H3 Plants: Life on the Edge
BIOC40H3 Plant Physiology
BIOC54H3 Animal Behaviour
BIOC59H3 Advanced Population Ecology
BIOC62H3 Role of Zoos and Aquariums in Conservation
BIOD26H3 Fungal Biology & Pathogenesis

BIOD34H3 Conservation Physiology
BIOD37H3 Biology of Plant Stress
BIOD43H3 Animal Movement and Exercise
BIOD45H3 Animal Communication
BIOD48H3 Ornithology
BIOD53H3 Special Topics in Animal Behaviour
EESC30H3 Environmental Microbiology

BIOC90H3 Integrative Multimedia Documentary Project (CR/NCR 0.0 credit)*
*Note: Completion of BIOC90H3 is a graduation requirement for students in this program. Concurrent enrolment in one of the participating BIO C-level courses is required for enrolment in BIOC90H3. Please see BIOC90H3 in the Calendar for important information.

B. Senior Research Courses (optional)
Students interested in graduate research are encouraged to take one or more of the independent research courses offered in Biological Sciences as part of their degree.
BIOD95H3 Supervised Study in Biology
BIOD98Y3 Directed Research in Biology
BIOD99Y3 Directed Research in Biology