UNIVERSITY OF TORONTO SCARBOROUGH

OFFICE OF THE CAMPUS COUNCIL

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

TO: UTSC Academic Affairs Committee

SPONSOR: William Gough, Vice-Principal Academic and Dean
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PRESENTER: Mary Silcox, Vice-Dean Graduate
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DATE: February 6, 2018 for February 13, 2018

AGENDA ITEM: 4

ITEM IDENTIFICATION:

Minor Graduate Curricular Modifications [for approval]

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, 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] (February 13, 2018)**

PREVIOUS ACTION TAKEN:

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

HIGHLIGHTS:

This package includes minor modifications to graduate curriculum, submitted by the Graduate Department of Physical and Environmental Sciences (DPES), which require

governance approval. Minor modifications to curriculum are understood as those that do not have a significant impact on program or course learning outcomes. They require governance approval when they modestly change the nature of a program or course.

Changes are being made to the Master's of Environmental Science (MEnvSc) to add EES1136H as an optional course in the Climate Change Impact Assessment field.

Changes are being made to the PhD in Environmental Science to establish additional program requirements for direct entry students, in compliance with School of Graduate Studies (SGS) academic regulations.

FINANCIAL IMPLICATIONS:

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

RECOMMENDATION:

Be It Resolved,

THAT the minor modifications submitted by UTSC Graduate Department of Physical and Environmental Sciences, described in 2018-19 Curriculum Cycle: Graduate Minor Curriculum Modifications for Approval, Report 1, dated January 25, 2018, and recommended by the Vice-Principal Academic and Dean, Professor William Gough, be approved effective for the academic year 2018-19.

DOCUMENTATION PROVIDED:

1. 2018-19 Curriculum Cycle: Graduate Minor Curriculum Modifications for Approval Report 1, dated January 25, 2018.

UNIVERSITY OF TORONTO SCARBOROUGH

2018-19 Curriculum Cycle
Graduate Minor Curriculum Modifications for Approval
Report 1

January 25, 2018

Graduate Department of Physical and Environmental Sciences

Program Changes

Master's of Environmental Science

Summary

	Changing admission requirements		Renaming field, concentration or emphasis
X	Changing program requirements or length		Renaming of program
	Changing timing of program requirements		Creating a new emphasis
	Adding/removing option (i.e., part-time, flexible-time)		Changes to programs affecting an MOA

Summary:
Currently, the program requirements for the MEnvSc field in Climate Change Impact Assessment include 3.0 FCEs in specified required courses – EES1100H, EES1117H, EES1131H, EES1132H, EES1133H and EES1134H.

EES1136H is a suitable alternative course for EES1131H or EES1134H. To make the field more flexible, students will now be able to select 2 of these 3 courses and apply them towards the completion of the 3.0 FCEs.

Effective Date of Change

September 1, 2018

Academic Rationale

EES1136H *Climate Change Adaptation* is not currently a requirement of the CCIA field, but it is pedagogically highly related to the field. The "core" courses of the CCIA field consist of EES1100H (Graduate Seminar), EES1117H (Climate Change Impact Assessment), EES1132H (Climate Data Analysis) and EES1133H (Climate Change Science and Modelling); permitting any of these courses to be optional would be detrimental, academically.

The courses EES1131H (Applied Climatology), EES1134H (Climate Change Policy) and EES1136H (Climate Change Adaptation) are slightly less critical individually to the overall program, but including these areas is an important breadth requirement for

the program. Since this field includes 0.5 FCEs to 1.0 FCEs depending on the option, adding EES1136H as an additional requirement would not be tenable. Given this, EES1136H fits best as a breadth option with EES1131H and EES1134H (students would complete 2 of 3 courses). A student completing the "core" courses and 2 of the 3 "binned" courses will graduate as a highly qualified climate specialist.

Impact on Students

No impact on continuing students as this is a one-year program and there are currently no part-time students enrolled in the CCIA field.

We foresee no detrimental impact on incoming students. We will include advice on course selection to incoming students during orientation and on our website.

Consultation

We have consulted with faculty who participate in the field, including Professors Smith, Klenk, MacLellan, Mohsin, Mirza and Gough. As per feedback from Professor Mohsin, the proposed change was tentatively agreed upon 2 years ago. Professors Smith, Klenk and MacLellan are in agreement with the change. Professor Gough suggested the "binning" in his feedback as well.

Resources

There will be no impact on resources.

Calendar Entry: **Master of Environmental Science**

Program Description

The MEnvSc is a 12-month degree program committed to the development of well-trained practitioners in environmental science in all fields, primarily to meet the needs of industry, governments, and environmental policy/education organizations.

The MEnvSc offers three enrolment options—research, internship, and part-time studies—in each of the three fields. The three designated fields of study are:

1. Biophysical Interactions in Terrestrial and Aquatic Systems: A major focus is understanding the flux of contaminants and excess nutrients through surface and sub-surface environments and the methods/solutions needed to remediate contaminated or damaged environmental systems.
2. Climate Change Impact Assessment: Students are trained in the science, data analysis, and rigorous assessment process for the impacts of climate change on a wide range of natural and human systems.
3. Conservation and Biodiversity: A major focus is the application of ecological theory and principles to real-world conservation challenges.

In all three fields, students can opt for an internship or a research option after eight months of coursework. The Department of Physical and Environmental Sciences has the support of two dedicated internship coordinators who help them to find and successfully complete an internship by focusing on development of their job seeking, interpersonal, communication, and critical thinking skills. The MEnvSc program works closely with a broad employer base for internship opportunities. Research-

stream MEnvSc students receive intensive and individualized academic and research support from mentors of their choice.

Full-time and part-time study options are available in all fields and study modes.

Field: Biophysical Interactions in Terrestrial and Aquatic Systems

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Graduate Department of Physical and Environmental Sciences' additional admission requirements stated below.
- Applicants whose primary language is not English, and who graduated from a university where the language of instruction and examination was not English, must demonstrate proficiency in English. See General Regulations section 4.3 for requirements.
- A minimum mid-B grade average in the last two years of the undergraduate program.
- Applicants must submit a written statement explaining their objectives for entering the program and the suitability of their background. Appropriate post-graduate work experiences will be considered as part of the admission application.
- A science or engineering undergraduate degree including at least two half courses or one full course in each of chemistry, physics, calculus, and biology.

Program Requirements

- **Coursework** consists of **5.5 full-course equivalents (FCEs)** as follows:
    - EES 1100H *Advanced Seminar in Environmental Science* (0.5 FCE)
    - Complete either:
        - 3.0 FCEs in elective courses (see the course list) and 2.0 FCEs for the internship (EES 1116Y) **or**
        - 3.5 FCEs in elective courses (see the course list) and 1.5 FCEs for the research paper (EES 1101Y). Students planning to complete the research paper option must complete the prerequisite EES 1114H.
- Students will choose either a research or internship option.
  Research option: Each student is required to have a research supervisor. For full-time students, the intensive research necessary for the research paper will normally be completed in the final Summer session. The final research paper needs to be written in scientific journal format and will be presented and defended orally in front of an examination committee. The committee will include the supervisor and two other members of the graduate faculty.
  Internship option: For full-time students, the placement in private industry, government, or a non-governmental organization (NGO) will normally be completed in the final Summer session. It will consist of a minimum of four consecutive months. Successful completion of the internship is based on an assessment completed by the student's work supervisor and on an assessment of a written placement project report.
- A final grade below 70% in any course equates to an FZ, which is an insufficient grade. A MEnvSc student who receives more than one final grade of FZ (i.e., two or more) will be recommended for termination of registration from the MEnvSc program.

Program Length

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

Time Limit
3 years full-time;
6 years part-time

Field: Climate Change Impact Assessment

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Graduate Department of Physical and Environmental Sciences' additional admission requirements stated below.
- Applicants whose primary language is not English and who graduated from a university where the language of instruction and examination was not English must demonstrate proficiency in English. See General Regulations section 4.3 for requirements.
- A minimum mid-B grade average in the last two years of the undergraduate program.
- Applicants must submit a written statement explaining their objectives for entering the program and the suitability of their background. Appropriate post-graduate work experiences will be considered as part of the admission application.
- A science or engineering undergraduate degree including at least two half courses or one full course in each of chemistry, physics, calculus, and biology.

Program Requirements

- **Coursework** consists of **5.5 full-course equivalents (FCEs)** as follows:
    - EES 1100H *Advanced Seminar in Environmental Science* (0.5 FCE)
    - EES 1117H *Climate Change Impact Assessment* (0.5 FCE)
    - ~~EES 1131H *Applied Climatology* (0.5 FCE) *(moved)*~~
    - EES 1132H *Climate Data Analysis* (0.5 FCE)
    - EES 1133H *Climate Change Science and Modelling* (0.5 FCE)
    - ~~EES 1134H *Climate Change Policy* (0.5 FCE) *(moved)*~~
    - Completion of 2 of the following courses:
        - EES 1131H *Applied Climatology* (0.5 FCE)
        - EES 1134H *Climate Change Policy* (0.5 FCE)
        - EES 1136H *Climate Change Adaptation* (0.5 FCE)
    - Completion of either:
        - 0.5 FCE in elective courses (see course list) and 2.0 FCEs for the internship (EES 1116Y), **or**
        - 1.0 FCE in elective courses (see course list) and 1.5 FCEs for the research paper (EES 1101Y). Students planning to complete the research paper option must complete the prerequisite (EES 1114H).
- Students will choose either a research or internship option.
  Research option: Each student is required to have a research supervisor. For full-time students, the intensive research necessary for the research paper will normally be completed in the final Summer session. The final research paper needs to be written in scientific journal format and will be presented and defended orally in front of an examination committee. The committee will include the supervisor and two other members of the graduate faculty.
  Internship option: For full-time students, the placement in private industry, government, or a non-governmental organization (NGO) will normally be completed in the final Summer session. It will consist of a minimum of four consecutive months. Successful completion of the internship is based on an assessment completed by the student's work supervisor and on an assessment of a written placement project report.

- A final grade below 70% in any course equates to an FZ, which is an insufficient grade. A MEnvSc student who receives more than one final grade of FZ (i.e., two or more) will be recommended for termination of registration from the MEnvSc program.

Program Length
3 sessions full-time (typical registration sequence: F/W/S);
6 sessions part-time

Time Limit
3 years full-time;
6 years part-time

Field: Conservation and Biodiversity

Minimum Admission Requirements
- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Graduate Department of Physical and Environmental Sciences' additional admission requirements stated below.
- Applicants whose primary language is not English and who graduated from a university where the language of instruction and examination was not English must demonstrate proficiency in English. See General Regulations section 4.3 for requirements.
- A minimum mid-B grade average in the last two years of the undergraduate program.
- Applicants must submit a written statement explaining their objectives for entering the program and the suitability of their background. Appropriate post-graduate work experiences will be considered as part of the admission application.
- An undergraduate degree in biology or a closely related field.

Program Requirements
- **Coursework** consists of **5.5 full-course equivalents (FCEs)** as follows:
    - EES 1100H *Advanced Seminar in Environmental Science* (0.5 FCE)
    - EES 3000H *Applied Conservation Biology* (0.5 FCE)
    - EES 3001H *Professional Scientific Literacy* (0.5 FCE)
    - EES 3002H *Conservation Policy* (0.5 FCE)
    - EES 3003H *Topics in Applied Biodiversity* (0.5 FCE)
    - Completion of either:
        - 1.0 FCE in elective courses (see the course list) and 2.0 FCEs for the internship (EES 1116Y) **or**
        - 1.5 FCEs in elective courses (see the course list) and 1.5 FCEs for the research paper (EES 1101Y).
- Students will choose either a research or internship option.
  Research option: Each student is required to have a research supervisor. For full-time students, the intensive research necessary for the research paper will normally be completed in the final Summer session. The final research paper needs to be written in scientific journal format and will be presented and defended orally in front of an examination committee. The committee will include the supervisor and two other members of the graduate faculty.
  Internship option: For full-time students, the placement in private industry, government, or a non-governmental organization (NGO) will normally be completed in the final Summer session. It will consist of a minimum of four consecutive months. Successful completion of the

internship is based on an assessment completed by the student's work supervisor and on an assessment of a written placement project report.
- A final grade below 70% in any course equates to an FZ, which is an insufficient grade. A MEnvSc student who receives more than one final grade of FZ (i.e., two or more) will be recommended for termination of registration from the MEnvSc program.

Program Length
3 sessions full-time (typical registration sequence: F/W/S);
6 sessions part-time

Time Limit
3 years full-time;
6 years part-time

PhD in Environmental Science

Summary

	Changing admission requirements		Renaming field, concentration or emphasis
X	Changing program requirements or length		Renaming of program
	Changing timing of program requirements		Creating a new emphasis
	Adding/removing option (i.e., part-time, flexible-time)		Changes to programs affecting an MOA

Summary:
Currently, there is no difference in terms of the program requirements for direct entry PhD students and students who are admitted to the program with a Masters degree, which contravenes School of Graduate Studies Degree Regulation 12.1.2.2. To meet SGS regulations, an additional 1.0 FCE is being added to the PhD course requirements.

Effective Date of Change

September 1, 2018

Academic Rationale

School of Graduate Studies Degree Regulation 12.1.2.2 requires that direct entry PhD programs include a “substantial portion of the requirements for the master’s degree”.

Physical & Environmental Sciences does not currently have a research-based master’s degree to compare requirements with and thus we have instead reviewed the direct entry requirements for cognate programs, including Chemistry (additional 1.0 FCE), Geography (additional 1.5 FCE), Earth Sciences (additional 0.5 FCE) and Cell and Systems Biology (no additional FCE, but PhD proposal requirement). An additional 1.0 FCE for direct entry Environmental Science PhD students is thus within the norms at UofT.

An additional 1.0 FCE is appropriate because it will increase the depth and breadth of

the students' knowledge without increasing their time to completion. Given the current course offerings in the PhD program, an addition of only 0.5 FCE would enable a direct entry to increase depth in one sub-disciplinary area, most likely to the detriment of gaining breadth in other important areas of inquiry in Environmental Science. A total of 1.0 FCE ensures both that a student can deeply delve into one sub-disciplinary area and also gain exposure to at least one other field in Environmental Science. This is a critical facet for intellectual preparation towards the PhD proposal. It was strongly felt that increasing beyond an additional 1.0 FCE for direct entry PhD students would in most circumstances delay the student's trajectory toward their candidacy.

A PhD proposal is already required for all PhD students in the program.

Impact on Students

The new requirement will not impact standard entry PhD students in the program.

Current direct-entry PhD students will be subject to the program requirements at the time they were admitted; however, their Supervisory Committee may recommend additional courses.

Going forward, direct-entry students will benefit from the new requirement as the additional 1.0 FCE will facilitate deepening their knowledge and expertise in areas relevant to their research, and better prepare them for their PhD proposal defence. The availability of courses is not a factor as students have the option of completing extra requirements within and/or outside the home graduate department.

The additional 1.0 FCE requirement is not expected to impact the time to completion.

Consultation

There was extensive consultation with Graduate Faculty in Physical & Environmental Sciences, with the PESSC Working Group, and also with the UTSC Dean's Office and the Provost's Office.

Resources

None

Calendar Entry: Doctor of Philosophy

Program Description

Research and teaching are focused on the interfaces between traditional disciplines in dealing with fundamental scientific issues. Faculty members are cross-appointed from several departments including: chemistry, earth sciences, geography, ecology and evolutionary biology, cell and systems biology, engineering, forestry, and social sciences. Research is clustered into six major concentrations:

1. Climate Change and the Environment
2. Contaminant Flux

3. Environmental Science in Transitional Economies
4. Great Lakes Ecosystems
5. Remediation and Restoration of Degraded Environmental Systems
6. Urban Geoscience

Applicants may be accepted into the PhD program via one of three routes: 1) following completion of an appropriate master's degree; 2) transfer from an appropriate master's program; or 3) direct entry following completion of an appropriate BSc degree.

PhD Program

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Graduate Department of Physical and Environmental Sciences' additional admission requirements stated below.
- Applicants may be accepted into the PhD program:
    - Following completion of the MEnvSc degree, an MSc degree in environmental science, or a related discipline, or the MASc degree in environmental engineering or related discipline, or equivalent from a recognized university with a minimum of B+ average in all work completed in the master's program.
    - By requesting transfer from a suitable master's program (see above); students may reclassify from the master's program after 12 months of full-time study. Transfer from the MEnvSc program is not permitted.
    - ~~in the case of exceptional students, by direct entry; that is, after completing an honours BSc degree in a bachelor's program in a related discipline with a minimum University of Toronto average of A- or equivalent.~~

Program Requirements

- **Coursework.** A total of **2.0 full-course equivalents (FCEs)** as follows:
    - A mandatory 0.5 FCE (EES 2200H *Advanced Seminar in Environmental Science*) plus 1.5 FCEs to provide background for the student's research. Courses selected must be approved by the student's supervisor and the Graduate Chair. In some cases, additional courses may be required if a student's preparedness is assessed as being insufficient.
    - Students may apply to take a number of PhD-level courses taught by the core faculty, both within the Graduate Department of Physical and Environmental Sciences and outside the Graduate Department of Physical and Environmental Sciences as part of their 1.5 FCEs for the degree. However, all courses for the PhD degree must be approved by the student's supervisor and the Graduate Chair.
- **Thesis.** The execution of an original piece of research in environmental science carried out under faculty supervision and presented in thesis form. The program requires the development and submission of a thesis proposal, and its examination in an oral thesis proposal appraisal (before the end of Year 2), a departmental oral examination of the completed thesis, and a Doctoral Final Oral Examination (FOE) carried out under the auspices of the School of Graduate Studies (SGS) involving examination by an appropriate at-arms-length external examiner.
    - The PhD proposal appraisal consists of a 20-minute presentation given by the student on the proposed thesis work followed by a question period of approximately two hours. The emphasis will be on the theory and proposed approach, rather than on progress to date. A negative outcome requires that the student retake the exam within four months after

incorporating recommendations from the committee for improving the thesis research proposal. The outcome of the second exam will be either a pass or withdrawal from the program.
    - The Graduate Department of Physical and Environmental Sciences' PhD program requires that all PhD candidates complete two thesis defences: a Departmental Thesis Defence and an FOE with SGS. Normally, the Departmental Thesis Defence will be held at least eight weeks prior to the FOE. The committee will notify the Graduate Chair that the thesis is ready to be forwarded to SGS for the FOE. If the PhD candidate does not pass the Departmental Thesis Defence, the committee may recommend that the PhD candidate postpone their FOE.

Program Length
4 years full-time; 5 years transfer-from-master's~~; 5 years direct-entry~~

Time Limit
6 years full-time; 7 years transfer-from-master's~~; 7 years direct-entry~~

PhD Program (Direct Entry)

Minimum Admission Requirements
- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Graduate Department of Physical and Environmental Sciences' additional admission requirements stated below.
- Applicants may be accepted into the PhD program:
    - In the case of exceptional students, by direct entry; that is, after completing an honours BSc degree in a bachelor's program in a related discipline with a minimum University of Toronto average of A- or equivalent.

Program Requirements
- **Coursework.** A total of **3.0 full-course equivalents (FCEs)** as follows:
    - A mandatory 0.5 FCE (EES 2200H *Advanced Seminar in Environmental Science*) plus 2.5 FCEs to provide background for the student's research. Courses selected must be approved by the student's supervisor and the Graduate Chair. In some cases, additional courses may be required if a student's preparedness is assessed as being insufficient.
    - Students may apply to take a number of PhD-level courses taught by the core faculty, both within the Graduate Department of Physical and Environmental Sciences and outside the Graduate Department of Physical and Environmental Sciences as part of their 2.5 FCEs for the degree. However, all courses for the PhD degree must be approved by the student's supervisor and the Graduate Chair.
- **Thesis.** The execution of an original piece of research in environmental science carried out under faculty supervision and presented in thesis form. The program requires the development and submission of a thesis proposal, and its examination in an oral thesis proposal appraisal (before the end of Year 2), a departmental oral examination of the completed thesis, and a Doctoral Final Oral Examination (FOE) carried out under the auspices of the School of Graduate Studies (SGS) involving examination by an appropriate at-arms-length external examiner.
    - The PhD proposal appraisal consists of a 20-minute presentation given by the student on the proposed thesis work followed by a question period of approximately two hours. The emphasis will be on the theory and proposed approach, rather than on progress to date.

A negative outcome requires that the student retake the exam within four months after incorporating recommendations from the committee for improving the thesis research proposal. The outcome of the second exam will be either a pass or withdrawal from the program.

- The Graduate Department of Physical and Environmental Sciences' PhD program requires that all PhD candidates complete two thesis defences: a Departmental Thesis Defence and an FOE with SGS. Normally, the Departmental Thesis Defence will be held at least eight weeks prior to the FOE. The committee will notify the Graduate Chair that the thesis is ready to be forwarded to SGS for the FOE. If the PhD candidate does not pass the Departmental Thesis Defence, the committee may recommend that the PhD candidate postpone their FOE.

Program Length
5 years full-time

Time Limit
7 years full-time