

**CARLETON UNIVERSITY COMMITTEE ON
QUALITY ASSURANCE**
Cyclical Review of the Undergraduate Programs in Environmental Science

Executive Summary and Final Assessment Report

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's undergraduate programs in Environmental Science are provided pursuant to the provincial Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP).

EXECUTIVE SUMMARY

The undergraduate programs in Environmental Science reside in the Institute for Environmental and Interdisciplinary Sciences, a unit administered by the Faculty of Science.

As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.13).

The External Reviewers' report offered a very positive assessment of the programs. Within the context of this positive assessment, the report nonetheless made a number of recommendations for the continuing enhancement of the programs. These recommendations were productively addressed by the Director of the Institute for Environmental and Interdisciplinary Sciences and the Dean of the Faculty of Science in responses to the External Reviewers' report and Implementation Plan that was submitted to SQAPC on September 9, 2021.

Environmental Sciences
Unit Response to External Reviewers' Report & Implementation Plan
Programs Being Reviewed: Undergraduate Programs

Note: This document is forwarded to Senate, the Quality Council and posted on the Vice- Provost's external website.

Introduction & General Comments

Please include any general comments regarding the External Reviewers' Report.

The Institute of Environmental and Interdisciplinary Science was pleased to receive the Reviewers' very positive External Reviewers' report on May 19th 2021. This report was shared with our faculty and staff, and we are committed to the continual improvement of our programs to enhance the student, staff, and faculty experience. This document contains both a response to the External Reviewers' Report and an Implementation Plan (Section B) which have been created in consultation with the Dean. We are thankful for the review team's dedication and thoughtful input.

For each recommendation **one** of the following responses must be selected:

Agreed to unconditionally: used when the unit agrees to and is able to take action on the recommendation without further consultation with any other parties internal or external to the unit.

Agreed to if additional resources permit: used when the unit agrees with the recommendation, however action can only be taken if additional resources are made available. Units must describe the resources needed to implement the recommendation and provide an explanation demonstrating how they plan to obtain those resources. In these cases, discussions with the Deans will normally be required and therefore identified as an action item.

Agreed to in principle: used when the unit agrees with the recommendation, however action is dependent on something other than resources. Units must describe these dependencies and determine what actions, if any, will be taken.

Not agreed to: used when the unit does not agree with the recommendation and therefore will not be taking further action. A rationale must be provided to indicate why the unit does not agree (no action should be associated with this response).

Calendar Changes

If any of the action items you intend to implement will result in calendar changes, please describe what those changes will be. To submit a formal calendar change, please do so using the Courseleaf system.

UNIT RESPONSE AND IMPLEMENTATION PLAN

Programs Being Reviewed: Undergraduate programs in Environmental Sciences

Prepared by (name/position/unit): S. Cooke

External Reviewer Recommendation & Categorization	Unit Response (choose only one for each recommendation): 1- Agreed to unconditionally 2- Agreed to if additional resources permit (describe resources) 3- Agreed to in principle 4- Not agreed to Rationales are required for categories 2, 3 & 4	Action Item	Owner	Timeline	Will the action described require calendar changes? (Y or N)
<p>1. Concern: Protecting the Program. With no Environmental Sciences department, there is the danger that home departments may 'call back' faculty to teach core courses in their home departments. As a concern for Carleton, we recommend exploring the advantages of either creating a Department of Environmental Sciences or merging the Institute with an existing Department in order to ensure the maintenance of the Program.</p>	<p><i>Not agreed to</i></p>	<p><i>A perpetual debate... re: where to position Environmental Science units within universities. The concern raised re home departments pulling back faculty to teach in those units fails to realise that teaching duties are the purview of our institute. Faculty affiliations to so called home departments are only for research and graduate student supervision. We do not have any concern in this regard and are confident that the current model of us operating as an Institute with a focus on undergraduate programming serves us, our students, and our institution the best.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>2. Concern: Program Concentrations. We note that most undergraduate students do not choose to follow one of the prescribed areas of concentration offered by the Program. Undergraduate students may not be declaring a concentration as they are unaware of the opportunities of the concentration for graduate and career advancement. We recommend that the undergraduates be fully informed in their first year of what the (now four) concentrations entail, and opportunities each concentration provides for future graduate work and career paths.</p>	<p><i>Agreed to in principle</i></p>	<p><i>Concentrations (and minors) are optional elements that students may choose to add to their degree programs, not required. Concentrations are only available to students in the Honours program, not the Major degree program. This is a limitation for some students.</i></p> <p><i>Concentrations remove elective options and replace with required courses. A disadvantage to students who transfer into the program from another degree i.e. Engineering, as the degree will require more time to complete.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>Fall 2021 and moving forward</i></p>	<p><i>N</i></p>

		<i>Concentrations are currently discussed every fall term at Science Orientation Day with new first year students and in ENSC 1500 taught by Dr. Cooke (Director, ENSC program). ENSC 1500 is offered in fall 2021 and beyond.</i>			
3. Concern: Course Learning Objectives. We recommend that faculty and instructors revisit their course learning objectives stated in their course outlines and ensure that they are in line with the Program learning outcomes. We recommend the faculty to revisit learning outcomes in their syllabi and ensure that the course learning outcomes align with the Program learning outcomes and that the course learning outcomes state how the outcomes will be achieved.	<i>Agreed to in principle</i>	<i>Instructors review course-learning objectives regularly to ensure they meet the overall program objectives. Some flexibility is important to ensure academic freedom. We have added a number of new courses in the last few years so we will revisit syllabi and ensure they align with program learning outcomes.</i>	<i>ENSC Curriculum Committee</i>	<i>Ongoing efforts to refine our program – Unit meetings occur ~ 4 times annually. No further action.</i>	<i>N</i>
4. Concern: Program Road Map. The Program road map presented on the website is not useful for navigating through the undergraduate degrees. While we understand that the Road Map is used for promotional purposes, we recommend that an updated, more accurate Road Map should be placed on the website	<i>Not agreed to</i>	<i>The roadmap was as a trial run for one on campus Recruitment event in 2019. It is a recruitment tool only. It is not used by current students or advisors nor was that the intention. Students and Advisors follow undergraduate calendar and academic audits for degree progression information and course selections. Creating a separate map that differs from the calendar may cause confusion. We use the calendar along with individual advising to guide students.</i>	<i>Director and Administrator</i>	<i>No further action.</i>	<i>N</i>
5. Concern: Experiential learning. We recommend that Carleton should ensure the permanence of courses that offer experiential learning and continue to subsidize these courses as they offer a competitive advantage for Carleton for student recruitment and retention. Specifically, field courses and group research courses offer excellent experiential learning opportunities for students in	<i>Agreed to unconditionally</i>	<i>Environmental Science program offers two-field courses annually, one in second year and one in third year. Group project course is a third-year course required for all Honours students. As required core courses in the program, these courses must be offered annually.</i>	<i>Dean of Science</i>	<i>Ongoing budget support for field courses, no further action.</i>	<i>N</i>

<p>the Program. Both students and faculty cited these courses as unique and formative experiential learning elements for the undergraduate degrees. Elements within the courses (for example, field visits that brought students in contact with federal policy makers) are additional components which make courses exceptional in the Program.</p>		<p><i>Exception-COVID in fall 2020. Could not offer the second-year field course. Third year field course and third year group project offered with adjustments for online learning.</i></p> <p><i>The Dean of Science has been extremely supportive of such programming so as long as we have budget to do so we will continue to deliver field courses.</i></p>			
<p>6. Concern: Faculty workload (supervision). As undergraduate projects are required components of Honours undergraduate degrees, faculty supervision of undergraduate projects should be explicitly acknowledged and taken into account with respect to teaching loads.</p>	<p><i>Agreed to unconditionally:</i></p> <p><i>Activities are already being done for this recommendation</i></p>	<p><i>Measures introduced to help faculty with thesis project workloads, include CGPA cutoff for undergraduate thesis course and an option for students to complete a directed study and 0.5 credit of coursework. Such activities are valued (and expected) as part of annual reviews needed to assess CDIs. Quite simply – we do this.</i></p>	<p><i>Director and Faculty</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>7. Concern: Curriculum. We recommend the development of courses in Restoration Ecology and Indigenous ways of conducting environmental science (i.e., indigenous knowledge and community engagement)</p>	<p><i>Agreed to if additional resources permit:</i></p>	<p><i>Agreement with courses in both areas, if resourced appropriately. Will discuss the possibility with our IEIS Faculty members during Fall of 2021 and then discuss with the Dean at our 2022 budget meeting.</i></p>	<p><i>Dean of Science and Director</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>8. Concern: Cross Appointments. A concern for the review team was whether Faculty Cross Appointments were protected, and that teaching staff had long-term commitments from home departments. We were assured that this was not an issue. We recommend that a mechanism is put in place in the form of an annual review to ensure that these cross-appointments are protected</p>	<p><i>Not agreed to</i></p>	<p><i>Standardizing terminology across Carleton, re: use of terms like cross appointments extends beyond our unit. Moreover, our cross appointments are protected – they are part of our employment contracts.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>

<p>9. Concern: Stronger links with Departments that house required courses. We recommend that there should be stronger links with departments that deliver required courses for the degree. Specifically, STATS 2507 was seen as a challenge as students did not see Environmental Sciences reflected in the course content. A similar challenge has been encountered with Chemistry. By establishing better communication with these departments, material in these courses could be developed to address elements of environmental science that would make the content more relevant to students in the Program without compromising course contents.</p>	<p><i>Agreed to unconditionally</i></p> <p><i>Activities are already being done for this recommendation</i></p>	<p><i>Communications with sisters units is important and continues to be something that we work to improve to benefit the students. There are inherent challenges in that STATS 2507 is for students across the entirety of the Faculty of Science and are not tailored to the env. However, we have our own ENSC analysis course where we dig deeper with only environmental examples.</i></p> <p><i>Our new Data Science faculty member in IEIS, Dr. Rachel Buxton, will be a link to strengthen collaborations with Math\Stats unit.</i></p>	<p><i>Director and Faculty</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>10. Concern: Graduate Program in Environmental Sciences. With no graduate program in Environmental Sciences, there is no natural progression for undergraduate Environmental Sciences students to continue in a multidisciplinary graduate program. We recommend the establishment of a graduate program in Environmental Sciences that includes both thesis-based options (PhD and MSc) and course-based (Masters) options</p>	<p>Two separate comments:</p> <p>a) Not agreed to:</p> <p>With no graduate program in Environmental Sciences, there is no natural progression for undergraduate Environmental Sciences students to continue in a multidisciplinary graduate program.</p> <p>b) Agreed to in principle:</p> <p>We recommend the establishment of a graduate program in Environmental Sciences that includes both thesis-based options (PhD and MSc) and course-based (Masters) options</p>	<p>a) Environmental Science students have excellent paths\opportunities to graduate studies, should they wish to pursue them.</p> <p><i>First year seminar (ENSC 1500) students are introduced to ENSC faculty members, four of five faculty with established, successful (NSERC and Industry) funded research programs---stimulates ideas and discussions of where a career in science can lead too.</i></p> <p><i>Two field courses that reinforce research skills, experimental design, collaboration, professional skills-presentations, communication. Students meet industry professionals and government research scientists.</i></p> <p><i>Group project course builds on research to include, community partnerships and stakeholder engagement</i></p> <p><i>Multidisciplinary connections made with faculty in sister units while taking core courses in Biology, Chemistry, Earth Sciences, and Physical Geography.</i></p> <p><i>All of the above introduces and enlightens students to the variety of options for undergraduate thesis</i></p>	<p><i>Director</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>

		<p><i>research and graduate research areas. A natural progression does not mean that students need to stay in the same unit where they did their undergrad. Their degree opens many doors at Carleton and beyond.</i></p> <p>b) <i>At this time, focus is on establishment and growth of Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019</i></p> <p><i>Thinking about a graduate program for many years. Needs new faculty and teaching resources. Notably, U Ottawa has a newish and very good professional degree MSc in Environmental Sustainability, which may fill this niche already.</i></p>			
<p>11. Concern: Institutional Terminology. There exists ambiguity between the terms Programs, Departments, Institutes, Centers and Schools. We understand that some of these are legacy terms, but we recommend that some definition be established to remove ambiguity and establish their level in the university hierarchy</p>	<p><i>Not agreed to</i></p>	<p><i>Standardizing terminology across Carleton, re: use of terms like Institute, Centre, Program, Department etc. extends beyond our unit.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>12. Weakness: Review hiring and retention practices: We recommend that mechanisms for ensuring the retention of instructors should be implemented. This problem was highlighted when two key instructors resigned just prior to the site visit</p>	<p><i>Not agreed to</i></p>	<p><i>The resignations of two long time contract instructors (CUPE 4600) were not unexpected. CI's had expressed their intentions in recent past.</i></p> <p><i>Demands of COVID (2020) changed situations for both CI's – one opted to retire rather than deal with online teaching and the other had ongoing child care challenges and their research activities as a Research Associate in Biology required more time.</i></p> <p><i>Teaching assignments were re-arranged.</i></p> <p><i>Planning underway to request a new faculty position to enhance collaborations with sister units in 2023.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>

<p>13. Weakness: Co-op Program. We recommend that more support is provided for students in the co-op stream. This should be accomplished by establishing a dedicated position in the co-op office dedicated to science student placements</p>	<p><i>Not agreed to</i></p>	<p><i>Co-op Department manages the co-op program and already has dedicated faculty of science program advisors.</i></p>	<p><i>Co-op Department</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>14. Opportunity: Graduate programs. Although listed as a Concern, we also see Graduate Programs as an opportunity for the Carleton Environmental Science Program.</p> <ul style="list-style-type: none"> • <u>Research based graduate program (MSc and PhD)</u> <ul style="list-style-type: none"> - the Program already prepares a good cadre of environmental scientist with research skills through the senior projects and Honour's thesis courses (ENSC 4906 - Honours Research Project). With no graduate program in Environmental Sciences, there is no natural progression for undergraduate Environmental Sciences students to continue in a multidisciplinary graduate program. We recommend that Carleton should consider the establishment of a graduate program in Environmental Sciences for thesis- based options (PhD and MSc) • <u>Course-based Masters Program</u>- several professionals would like to enhance their credentials to advance their careers. Further, students who have just finished undergraduate degrees are often looking to expand their skill set. Consider a course-based Masters program, perhaps with online or evening course offerings, that would allow individuals maximum flexibility in obtaining advanced credentials 	<p><i>Agreed to in principle</i></p>	<p><i>IEIS (ENSC) -Institute of Environmental and interdisciplinary Science focused on establishment and growth of Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019.</i></p> <p><i>A Graduate program is a great idea with many challenges. Only if the Dean provides new faculty teaching resources. There is much to discuss here and if we were to go down this path it would likely be course based. However, as noted above U Ottawa already has a successful Environmental Sustainability professional MSc so that niche is already filled to some extent. Discussions with the Dean\Director will resume in 2022.</i></p>	<p><i>Director Dean</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>

<p>15. Opportunity: Professional Accreditation. We recommend that students early (in the first year of the Program) in the Program be made aware of the Professional Geoscientists Ontario (PGO) Accreditation made available through the Environmental Science with Concentration in Earth Sciences B.Sc. Honours</p>	<p><i>Agreed to in principle</i> <i>Activity is already being done for this recommendation</i></p>	<p><i>Richard Amos- ENSC faculty cross appointed with Earth Sciences is PGO rep for Carleton. Introduces PGO to first year students in ENSC 1500 and teaches ENSC 2000 where he discusses PGO accreditation. Advises students in concentration in Earth Sciences.</i></p>	<p><i>ENSC Faculty- Richard Amos</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>16. Opportunity: Alumni Outreach and Tracking the Program. We recommend that Carleton conduct periodic alumni surveys and other mechanisms for tracking job outcomes for graduates, as well as other information and feedback (e.g., salary, most useful courses, potential new courses), to measure overall quality of the Program</p>	<p><i>Agreed to in principle</i></p>	<p><i>Alumni outreach in recent years was carried out with minimal success.</i></p>	<p><i>Director and Administrator</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>
<p>17. Opportunity: New Student Recruitment. Although there are not pressures for student recruitment at this time there may be in the future. We therefore recommend that Carleton:</p> <ul style="list-style-type: none"> • Expand links to relevant Programs at Algonquin College, and other colleges with ancillary Programs. This could include providing equivalent credits for courses and advanced standing in the Environmental Science Program. • Provide information to High School councillors throughout your catchment area about the Environmental Science Program. • Have current students and former alumni visit the high schools they graduated from and talk about the Program with the senior students. • Explore expanding the catchment area for students beyond Eastern Ontario, the area that most students appear to be drawn from by promoting the “Capital Advantage”. 	<p><i>Agreed to in principle</i> <i>Activities are already being done for this recommendation</i></p>	<p><i>- Entry\admission opportunities exist for college students. We are able to work with students to create pathways that work for them given their individual circumstances.</i></p> <p><i>-ENSC participates in Oct and March break CU Recruitment Fairs. Current students attend fairs to help promote program.</i></p> <p><i>-Faculty phone calls are completed each year.</i></p> <p><i>-Recruitment letter from the Director of ENSC emailed to prospective ENSC students with help from Undergraduate Recruitment Office.</i></p> <p><i>-Director (or designate) attends all formally organized CU Science Recruitment events incl. Ottawa and GTA Parents evenings</i></p> <p><i>-CU Recruitment Office arranges all formal high school outreach.</i></p>	<p><i>Director and Offices of Admissions Services and Undergraduate Recruitment at Carleton.</i></p>	<p><i>No further action.</i></p>	<p><i>N</i></p>