Update on Unit Response to External Reviewers' Report & Action Plan
Programs Being Reviewed: Undergraduate Programs in Environmental Science
Completed by: Steven Cooke, Director, Institute of Environmental and Interdisciplinary Science, Michelle Santoianni, Administrator, Institute of Environmental and Interdisciplinary Science
Approved by Dean: Dr. Maria DeRosa, Dean, Faculty of Science, Carleton University

Note: This document is made available for public posting on the Vice- Provost's website.

***** Denotes items that SQAPC would like the unit to pay particular attention to based on their past review of the original action item.**

External Reviewer Recommendation	Original Action Item	Owner & Timeline	Progress Update June 2022	Will the action described require calendar changes? (Y or N)
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.	*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 realize 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.*	*Director and Administrator - No further action.*	*No changes to report. No further action.*	*N*
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,	*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.*	*Director and Administrator - Fall 2021 and moving forward*	*Ongoing action. Administrator continues to advise students regarding program elements (concentrations and minors) that may be of interest to them or where students have partially completed elements unknowingly or have expressed interest in a particular area of study.*	*N*

and opportunities each concentration provides for future graduate work and career paths.	*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.*			
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.	*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.*	*ENSC Curriculum Committee - Ongoing efforts to refine our program – Unit meetings occur ~ 4 times annually. No further action.*	*Continuing with unit meetings (~4 times annually) where various academic topics are discussed including curriculum initiatives. No further action*	*N*
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	*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.*	*Director and Administrator - No further action.*	*The Undergraduate Calendar and student audits are the official documents at Carleton that all students and advisors should reference to understand the degree program requirements. No further action.*	*N*

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 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.	*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.* *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.* *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.*	*Dean of Science - Ongoing budget support for field courses, no further action.*	*Ongoing as the field courses are required courses in the Environmental Science degree programs. Both courses are offered every fall term and resume in full in fall 2022.* *Dean of Science - Ongoing budget support for field courses, no further action.*	*N*
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.	*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.*	*Director and Faculty - No further action.*	*Faculty continue to mentor/supervise undergraduate thesis and directed study coursework.* *These courses are valuable learning experiences for students. No further action.*	*N*
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)	*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.*	*Dean of Science and Director - No further action.*	*Continued interest in expanding course offerings in areas already described and beyond. Our new course available in winter 2023- Environmental Solutions and Sustainability Science will introduce students to concepts and knowledge systems, foster creative ideas for interdisciplinary problems.* *Other courses are possible if resources permit from the Dean of Science.*	*Completed-new course added to undergraduate calendar for 22-23 academic year.*

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	*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.*	*Director and Administrator - No further action.*	*No further action.*	*N*
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.	*Communications with sisters units is important and continues to be something that we work to improve to benefit the students. There are inherent challenged 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.* *Our new Data Science faculty member in IEIS, Dr. Rachel Buxton, will be a link to strengthen collaborations with Math\Stats unit.*	*Director and Faculty - No further action.*	*Ongoing action. Always communicating and looking for collaborative opportunities with other units on campus. Currently working with Earth Sciences on a joint faculty hire for 22-23, if approved by Dean of Science.*	*N*
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	***a)*** *Environmental Science students have excellent paths\opportunities to graduate studies, should they wish to pursue them.* *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.* *Two field courses that reinforce research skills, experimental design, collaboration,*	*Director – No Further Action*	*Director – No Further Action.* *Environmental Science students have excellent paths\opportunities to graduate studies, should they wish to pursue them.* *At this time, focus is on establishment and growth of Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019.*	*N*

	professional skills-presentations, communication. Students meet industry professionals and government research scientists. *Group project course builds on research to include, community partnerships and stakeholder engagement* *Multidisciplinary connections made with faculty in sister units while taking core courses in Biology, Chemistry, Earth Sciences, and Physical Geography.* *All of the above introduces and enlightens students to the variety of options for undergraduate thesis 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.* ***b)** At this time, focus is on establishment and growth of Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019.* *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.*			

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	*Standardizing terminology across Carleton, re: use of terms like Institute, Centre, Program, Department etc. extends beyond our unit.*	*Director and Administrator – No Further Action*	*Director and Administrator – No Further Action*	*N*
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.	*The resignations of two long time contract instructors (CUPE 4600) were not unexpected. CI's had expressed their intentions in recent past. 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.* *Teaching assignments were re-arranged.* *Planning underway to request a new faculty position to enhance collaborations with sister units in 2023.*	*Director and Administrator – No Further Action*	*Director. New CI (Rogers) for IEIS will bring consistency to our ENSC 2001 course for the next couple of years. Currently collaborating with Earth Sciences on a joint faculty member hire for 22-23, if approved by Dean of Science.*	*N*
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	*Co-op Department manages the co-op program and already has dedicated faculty of science program advisors.*	*Co-op Department – No Further Action*	*Co-op Department – No Further Action*	*N*
14. Opportunity: **Graduate programs.** Although listed as a **Concern**, we also see Graduate Programs as an opportunity for the Carleton Environmental Science Program. • <u>Research based graduate program (MSc and PhD)</u> - the Program already prepares a good cadre of environmental scientist with research skills through	*IEIS (ENSC) -Institute of Environmental and interdisciplinary Science focused on establishment and growth of Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019.* *A Graduate program is a great idea with many challenges. Only if the Dean*	*Director* *Dean* *No Further Action*	*Director/Dean of Science. No further action.* *IEIS focus is on continuing to develop a high quality undergraduate experience for both Environmental Science and ISAP students along with the continued establishment and growth of the Interdisciplinary Science and Practice program (ISAP) introduced in fall 2019.*	*N*

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) Course-based Masters Program- 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	*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.*			
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	*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.*	*ENSC Faculty-Richard Amos - No further action.*	*ENSC Faculty-Richard Amos - No further action.*	*N*
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	*Alumni outreach in recent years was carried out with minimal success.*	*Director and Administrator – No action further*	*Director and Administrator – No action further*	*N*

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: • 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".	*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.* *-ENSC participates in Oct and March break CU Recruitment Fairs. Current students attend fairs to help promote program.* *-Faculty phone calls are completed each year.* *-Recruitment letter from the Director of ENSC emailed to prospective ENSC students with help from Undergraduate Recruitment Office.* *-Director (or designate) attends all formally organized CU Science Recruitment events incl. Ottawa and GTA Parents evenings* *-CU Recruitment Office arranges all formal high school outreach.*	*Director and Offices of Admissions Services and Undergraduate Recruitment at Carleton. – No Further Action*	*Director and Offices of Admissions Services and Undergraduate Recruitment at Carleton. – No Further Action.* *IEIS faculty and staff continue to attend and participate in Oct, March and May on campus recruitment fairs.* *IEIS faculty continue to participate in the Faculty phone our prospective students program under the direction of Undergraduate Recruitment.* *IEIS Director- personalized recruitment letter sent to prospective ENSC and ISAP students' winter 2022 via the approval and support of the Director of Undergraduate Recruitment.* *Director (or designate) attends all formally organized CU Science Recruitment events incl. Ottawa and GTA Parents evenings*	*N*

B4: PROGRAM LEARNING OUTCOMES ASSESSMENT PLAN

Summarize the learning outcomes assessment plan.
Who is responsible for program-level learning outcomes assessment (or curriculum changes and program improvement) within the unit? What assessment activities have been undertaken by the unit since the last review?
How have assessment findings been communicated within the academic unit? How have findings been used within the unit?
What assessment activities, methods, or tools will be implemented in the future?
Activities can include presentations, group work, performance, role play, etc. Artifacts can include exams, papers, reports, portfolios, cases, etc.

Faculty in the Institute of Environmental and Interdisciplinary Science (IEIS) assume responsibility for the assessment of program learning outcomes for the Environmental Science program. With a small core faculty cohort, we are able to engage in discussion and formalize our "best practices" as an agenda item at our regular unit meetings. The Director of IEIS reviews term-by-term grade submissions and teaching evaluations. Through discussions and curriculum review, faculty members come to a consensus to change and/or revise the content and/or format of the courses to ensure the relevancy and appropriate implementation of the courses to align with the Environmental science program's vision and student goals.

Our overarching criterion for program evaluation is the successful progress of our students through the curriculum. IEIS faculty are committed to student-centered learning, through our core Environmental Science courses, IEIS faculty members have a high level of contact with students. Smaller class sizes, a first year seminar, field courses, and a group project course enable significant opportunities to engage students outside the standard lecture style courses. IEIS faculty members are committed to continuous quality improvement to strengthen the program to benefit the student.

Student feedback is essential to the continued improvement of the Environmental Science program and courses. Our students maintain a strong CUSA recognized student association called ESSA, Environmental Science Student Association. Consistent access and communication between ESSA leadership and the ENSC faculty one strength of the association.

Table B.4: Summary of assessment plan

	2015-16	2016-15	2017-18	2018-19	2019-20	2020-21
L01	X	X	X	X	X	X
L02	X	X	X	X	X	X
L03	X	X	X	X	X	X
L04	X	X	X	X	X	X
L05	X	X	X	X	X	X
L06	X	X	X	X	X	X

The Environmental Science program began the last cyclical review assessment in 2014 and completed this process in 2016. Through this practice, we improved the program based on the recommendations and actions plans advised by the review. In 2010, the Environmental Science program received accreditation by ECO Canada, which requires re-certification on a seven-year basis. We renewed the accreditation in 2018. The accreditation process includes rigorous assessment of all aspects of the program including program and course objectives. Each review includes a site visit from external academic and industry

reviewers as representatives from ECO Canada. Our dissemination plan to communicate and discuss program assessment continues with reviews such as this current cyclical report, and in our standardized meetings at the end of each term, and on an as needed basis.

BSc. in Environmental Science
Update on Learning Outcomes Assessment Activities
Programs Being Reviewed: Environmental Science
Completed by: IEIS Director, Steven Cooke and IEIS Administrator, Michelle Santoianni

1. **Who is responsible for the assessment of program learning outcomes?**

☐ Learning Outcomes Assessment Committee

☐ Undergraduate/Graduate and/or Curriculum Committee(s)

☒ All faculty in unit

☐ Other: _

2. **Which program learning outcomes have been assessed since the last CPR? (*list the learning outcome statements, or abbreviated versions, below*)**

   L01-L06 of the Learning Assessment Plan

3. **What methods have been employed to assess the program learning outcomes? (*check all that apply*)**

☒ Reviews of examples of student work

☐ cuPortfolio

☐ Student surveys or focus groups

☒ Faculty retreats or discussion sessions

☒ Reviews of program curricula and courses (*includes efforts to align course and program learning outcomes*)

☐ Other _____

4. **Provide a brief description of the assessment activities undertaken since your last CPR Review.**

   Our primary assessment of student work occurs in two courses that serve in many ways as capstones and enable us to gauge the extent to which learning outcomes have been achieved. The first is the 3rd year group project course where students work closely with external partners to generate partner-relevant projects. These are "cross cutting" topics and require students to bring all of their training to the table. The course ends with presentations that are open to external partners and faculty members. The Director of the program has attended a number of the presentations enabling assessment of any deficiencies. We do the same thing with our Honours thesis course where all faculty members in our unit participate in a session where students deliver oral presentations and "defend" their thesis. This is an ideal way to see the extent to which students have the skills needed to get the most out of such a capstone experience. Because of COVID, we did not do any formal retreats but in June we have an "all hands" unit meeting where we will be reflecting on our teaching and learning objectives. Program curricula and courses are reviewed continuously based on feedback from students and faculty members. Admittedly, during COVID we have focused on core duties but look forward to revisiting some of these topics in a more meaningful way as things begin to return to normal**.**

5. **What assessement activites will be undertaken between now and your next CPR? When will these be implemented?**

   We have an online meeting in June of 2022 to discuss the development of new courses related to the assessment report. We will continue to use our group project course and thesis course as assessment tools for our program. We are also a small unit and have regular discussions with our students (including those who are members of our Environmental Science Student Association) about student interests and program needs.