

**CARLETON UNIVERSITY COMMITTEE ON
QUALITY ASSURANCE**

**Cyclical Review of the Undergraduate Programs in Earth Sciences
Executive Summary and Final Assessment**

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's undergraduate Programs in Earth Sciences are provided pursuant to articles 4.2.5-4.2.6 of the provincial Quality Assurance Framework and articles 5.1.9.23-24 and 5.1.9.26-27 of Carleton's Institutional Quality Assurance Process (IQAP).

EXECUTIVE SUMMARY

The B.Sc. Honour's degree (20 credits) and Combined Honour's degree, the B.Sc. Major (20 credits) and the B.Sc. General (15 credits) programs in Earth Sciences are administered by Carleton University's Department of Earth Sciences, an academic unit of the Faculty of Science. As a consequence of the review, the programs were categorised by the Carleton University Committee on Quality Assurance (CUCQA) as being of **GOOD QUALITY** (Carleton's IQAP 5.1.9.12).

The external reviewers' report, submitted in December 2014, offered a very positive assessment of the programs. The reviewers enthusiastically noted that "the Department enjoys a strong reputation with industry and government, and it boasts a large and supportive alumni base that spans the country." The report in addition praised "the 11 tenure-stream faculty of the Department of Earth Sciences, who are all research-active and internationally-recognized in their sub-disciplines of geology... Undergraduates greatly benefit from the diverse research expertise of the faculty and adjuncts, including experiential learning in the field and through hands-on experiences with many of the same instruments used for cutting-edge science."

The report concluded that "graduates of the Earth Sciences programs are well placed, after graduation, to continue their education by pursuing post-graduate work or to apply for registration as a Professional Geoscientist as they seek full time employment opportunities."

Within the context of this most positive assessment, the report nonetheless made several recommendations for the continuing enhancement of the undergraduate programs. These recommendations were accepted by the Department and Dean in a thorough response to the report of the external reviewers that was received by CUCQA in March 2015.

On 19 June 2015, CUCQA received and approved an Action Plan detailing how all these recommendation will be addressed. The recommendations and the actions to be taken are detailed in the Action Plan.

Response to Review of Undergraduate Programs in Earth Sciences Action Plan - May, 2015

The cyclical program review, in accordance with article 5.1.9.12 of Carleton's Institutional Quality Assurance Process, CUCQA has categorised the undergraduate programs in Earth Sciences as “**good quality**”. The Department of Earth Sciences is in agreement with the fifteen recommendations proposed by the External Reviewers. The following document, providing our responses to the recommendations, has been developed by the Department of Earth Sciences in collaboration with Dr. Butler, the Dean of Science. Please see Table 1 for a summary of our responses with assignment of responsibility and time lines for each recommendation.

Recommendations and replies:

1) Recommendation: Define the course level learning outcomes and map course level outcomes onto the program outcomes.

Reply: We see this as a constructive tool for evaluating our curriculum and ensuring that our courses dove-tail with each other. With the advice of Mr. Patrick Lyons and Ms. Samah Sabra of EDC, we are currently in the process of defining course level learning outcomes. We will map them back to the program outcomes and revise course outcomes as needed.

2) Recommendation: Seek strategic replacement of retiring faculty member with expertise that complements that of existing faculty and that supports the undergraduate program.

Reply: We intend to provide a rationale and make a formal request on a case by case basis as Faculty retire. We have the support of the Dean of Science to strategically replace upcoming retirements.

3) Recommendation: Addition of a new faculty in soft rock geology (e.g., Petroleum Geology, or siliciclastics), nanotech or medical/health geology to capture existing or emerging demands in the Earth sciences.

Reply: We intend to provide a rationale and make a formal request to the University for a Petroleum or Unconventional Resource Geoscientist. Given that we are below critical mass to deliver core courses for our professionally accredited programs, we rank positions that contribute to these programs over those that may take us in new directions.

4) Recommendation: Work with the Dean of Science and Advancement Officers to secure funding for an Endowed Chair in Resource Geology (unique to region).

Reply: We continue to approach philanthropists who may support the Endowed Chair, seek out ‘connectors’ that may help us identify prospective donors, work developing better connections with our Alumni, and continue to improve our image and publicize the department’s achievements.

5) Recommendation: Hire a permanent, full-time Laboratory Coordinator for 1st year Earth Sciences and 2nd year Engineering Geoscience laboratories.

Reply: The Dean of Science has approved this position for the 2015-16 budget cycle. Steps are now underway to have the position formally created, and we are on a schedule to advertise and fill the position in the fall of 2015.

6) Recommendation: Secure commitment from the Administration for the strategic replacement of retiring technical staff.

Reply: The next foreseeable retirement is Mr. Peter Jones, our microprobe specialist. Dr. Butler, the Dean of Science, recognizes that this position is built into the base budget and sees no reason that this position may not continue.

7) Recommendation: Secure suitable, perennially dry storage space for irreplaceable geologic samples and expensive field equipment.

Reply: The Dean of the Faculty of Science and the Chair of the Department of Earth Sciences continue to liaise with Ms. Anne Richards, the University Strategic Space planner, and to lobby university administrators to find solutions to this untenable situation.

8) Recommendation: Seek confirmation and a commitment from the Administration for the acquisition of research instruments for recent faculty hires.

Reply: The Dean of the Faculty of Science reiterates his pledge to support New Faculty in their acquisition of research facilities through support of instrument applications to funding agencies, as those opportunities become available.

9) Recommendation: Seek confirmation and a commitment from the Administration for the acquisition of new research instruments for teaching and research: namely, XRF hand-held analyzer and ITRAX core scanner.

Reply: In the case of the XRF hand-held analyzer, the Dean of Science has agreed to make this a funding priority in the 2016-17 and 2017-18 budget cycles. In the case of the ITRAX core scanner, Dr. Patterson is putting a team together to apply for external funding.

10) Recommendation: Publish and update, on a regular basis, a 2-year look-ahead course schedule so that students can better plan their preferred sequence of courses, particularly when courses are cycled.

Reply: This criticism mainly pertains to our 4th year course offerings. Compared to the ~10 year time period that was under consideration for the cyclical review, we have now stabilized our course offerings considerably; we have built up a roster of 4th year courses that will be offered annually. We will plan as much of our course delivery as possible on a two-year cycle, communicate the availability of courses to students well in advance, and counsel students as per items 12 & 13 (below). There are some limitations which cannot be overcome regarding scheduling of 4th year courses more than one year in advance (e.g., funds for contract instructors are approved on an annual basis; we are notified of fourth year courses offered in the Joint Institute, the Ottawa Carleton Geoscience Centre, by U of O, on relatively short notice, etc.).

11) Recommendation: Define methods of assessment for course and program learning outcomes for all programs.

Reply: We see these as tools for getting concrete feedback about course and program delivery in order to improve the quality of our courses and programs. Some assessments are in place (e.g. Honours theses, Honours student publications, etc.) and others will be embedded once course learning outcomes and mapping of course outcomes to program outcomes are complete.

12) Recommendation: Establish a 'Welcome to Earth Sciences' gathering (event?) at the end of 1st-year designed specifically to provide an overview of what to expect in 2nd, 3rd and 4th-year, including Field Geology at the end of 2nd-year, and how best to navigate course selection, as well as scholarship and summer internship opportunities.

Reply: We have done this starting in 2014-15, and plan to continue on an annual basis. Dr. Claudia Schroder Adams with the background support of the Departmental Administrators, Chair and Undergraduate Advisor hosts a mandatory information session and luncheon.

13) Recommendation: Provide 2nd and/or 3rd-year students with short-courses or mini-workshops focusing on useful software tools, including Excel and Illustrator, as well as geophysical and petroleum software, to further prepare them for the Research Methods course, research projects, and Honours theses during 4th-year.

Reply: Starting in 2014-15 we have developed and implemented strategies to address knowledge gaps such as those regarding computer software, as well as areas where there may be knowledge retention problems. As of Fall 2015, a new course, EARTH 4820 Research Methods in Earth Sciences, will be available to third and fourth year students on an annual basis. In Fall 2014 we appointed an Undergraduate Mentor who put on a program of academic and professional workshops, and provided office hours and one-on-one mentorship. The mentor worked with professors to identify academic areas for reinforcement, and liaised with our Department Computer Specialist and on-campus Career Services and Writing Tutorial Services to fill perceived gaps in student knowledge. Workshops included the following; Departmental Tour of Research Facilities, Mineralogy/Petrology Review, Computing Skills, Writing Tools & Strategies, Resume Writing, Learning to Learn – Learning Styles, and Time Management. We will further develop software workshops for inclusion in future Mentorship programs.

14) Recommendation: Investigate, in conjunction with Geography, and introduce, if feasible, a double major in Earth Sciences and Geomatics (or concentration/minor in Geomatics) that would appeal to students and reflect demand by employers.

Reply: A representative of the Department of Earth Sciences will liaise with GEOG/GEOM in the 2015-16 academic year and work to achieve this if possible. We already have close ties with GEOG/GEOM via the Ottawa Carleton Geoscience Centre, shared research interests, and shared interests in joint program initiatives such as the proposed Northern Studies program.

15) Recommendation: Conduct exit interviews with your graduating 4th year students; they will provide thoughtful suggestions for continued improvements, as well as long-term community building with your newly minted alums.

Reply: We will develop exit interviews and exit surveys (as part of the assessment of Learning Outcomes) with advice from Patrick Lyons and his colleagues. A template for an exit survey has just been developed as part of a national move by Earth Sciences Departments (via the Council of Canadian Earth Sciences Chairs and the Canadian Federation of Earth Sciences) to carry out exit surveys in parallel with a US program. The proposed web-based survey has been developed with standardized questions, for Canadian Universities, to collect information about how students are attracted to a program and where they end up being employed as well and a section that may be adapted for specific universities and departments. This template will be evaluated and adapted to our needs, if acceptable.

Table 1: Summary of recommendations, response and time lines.

	Recommendation	Action	Responsibility	Timelines
1	a. Define course-level learning outcomes and b. Map course-level outcomes onto the program outcomes	Define course-level learning outcomes, map course-level outcomes onto the program outcomes with curriculum discussions, revise course outcomes as needed and include in course syllabi	a. Chair, Faculty, Contract Instructors b. Chair, Faculty	a. October 2015 b. January 2016
2	Seek strategic replacement of retiring faculty member	Present rationale and request to administration upon notification of Faculty retirement	Chair (representing consensus of Department) & Dean of Science	Case by case: as soon as Faculty notifies university of retirement
3	Add new faculty in "softrock" geology, nanotech or medical/health geology	Present rationale and request to administration; seek funding opportunities for new positions (e.g. Banting)	Chair (representing consensus of Department) & Dean of Science	Initiate immediately; ongoing until successful
4	Work with Dean and Advancement to secure an Endowed Chair in Resource Geology	Approach philanthropists; identify 'connectors'; build Alumni network	Chair and Dean of Science	Ongoing; continue until successful
5	Hire full-time Laboratory Coordinator for 1st-year Earth Sciences and 2nd-year Engineering Geoscience laboratories	Permission has been granted by Dean of Science for 2015-16 budget cycle	Chair, Human Resources staff & Dean of Science	Ongoing; position will be created ASAP and filled in fall 2015.
6	Seek commitment from Administration for replacement of retiring technical staff	Present rationale and request to administration upon notification of staff retirement	Chair & Dean of Science	Case by case; : as soon as staff notifies university of retirement
7	Secure suitable, perennially dry storage space for samples and field equipment	Ongoing: requests are being put forward to strategic space planner and upper administrations by Dean of Science	Chair & Dean of Science	Ongoing; continue until successful
8	Seek commitment from Administration for the acquisition of research	Prepare proposals in conjunction with Research Services	PI & Dean of Science	Case by case

	instruments for recent faculty hires			
9	Seek commitment for the acquisition of new research instruments for teaching and research	Prepare proposals in conjunction with Research Services	a. XRF analyzer, Dr. Brian Cousins & Chair b. TRAX core scanner, Dr. Patterson (PI) & Research Services	a. 2016-17 or 2017-18 as funds available b. 2016-17
10	Publish a 2-year "look-ahead" course schedule for students to facilitate planning	Proactive student counselling, establishing regular patterns of fourth year course delivery	Undergraduate Administrator (Ms. Sarah Adams) under direction of Chair & Departmental Administrator (Mrs. Sheila)	Fall 2015
11	Define methods of assessment for course and program learning outcomes	Establish and implement assessment protocols for evaluating program learning outcomes	Chair and Department Faculty Members	Fall 2016
12	Establish a 'Welcome to Earth Sciences' event at the end of the 1st year to provide students with an overview of what to expect in 2nd, 3rd and 4th year	Schedule annual mandatory class meeting with 1 st year students	Dr. Claudia Schroder Adams with Undergraduate Supervisor (Dr. Patterson) and Undergraduate Administrator (Ms. Sarah Adams)	2015-16 Academic Year
13	Provide 2nd and/or 3rd-year students with short-courses or mini-workshops focusing on useful software tools	Integrate software workshops into Undergraduate Mentoring program	Undergraduate Department Mentor and Computer Specialist under direction of Chair	2015-16 Academic Year
14	Investigate with Geography the feasibility of a double major in Earth Sciences and Geomatics	Set up exploratory meetings with Geography and is successful, plan and propose a joint program	Dr. Tim Patterson	2015-16 Academic Year
15	Conduct exit interviews with your graduating 4th year students	Develop exit survey protocols; Adapt existing Geoscience surveys for our department purposes	Dr. Brian Cousins, Ms. Beth Halfkenny, (Ms. Sarah Adams)	Spring 2017, or sooner