

Final Assessment Report Academic Review

Earth Sciences

A. Summary

1. Self Study

The Department's Self Study was considered and approved by the Academic Review Committee of Senate on January 12, 2012.

2. Reviewers

- a) The Review Committee consisted of two external reviewers: Bruno Lafrance (Laurentian University) and Tim Patterson (Carleton University), and an internal reviewer, John Middleton (Tourism and Environment).
- b) The site visit occurred on February 1-3, 2012.
- c) The Reviewers' Report was received on March 9, 2012.

3. Report Responses

- a) The Department's response was provided on April 12, 2012.
- b) The Faculty Dean's response from Ejaz Ahmed was received on April 19, 2012.
- c) The Dean of Graduate Studies' response from Mike Pyley was received on April 22, 2012.

4. Subsequent Submissions

- a) Comment on a draft version of this FAR was received from the University Librarian on September 24, 2012.
- b) Comments on a draft version of this FAR was received from the Chair of Earth Sciences (Francine McCarthy) on October 10 and November 7, 2012.
- c) Comment on a draft version of this FAR was received from the Dean of Social Sciences on October 15, 2012.
- d) Comment on a draft version of this FAR was received from the Chair of Geography on November 7, 2012.

The academic programs offered by the Department which were examined as part of the review included:

BSc in Earth Sciences (Co-op and non Co-op)
BSc in Environmental Geoscience (Co-op and non Co-op)
MSc in Earth Sciences

This review was conducted under the terms and conditions of the IQAP approved by Senate on June 6, 2011.

The reviewers assigned the Department the outcome category 3, "Good Quality With Concerns".

B. Strengths of the Program

The reviewers state that the learning objectives:

are appropriate and tailored to their programs. The current and graduated undergraduate surveys provide an indication of how well these objectives have been met. The students are generally appreciative of the education they received and they feel that their education prepared them well for careers as geoscientists.

The reviewers comment on the fact that the department has been successful in meeting “a strong demand for highly paid trained earth science professionals in industry” and that, “the Department of Earth Sciences could, if properly resourced, become a crown jewel within the Faculty of Mathematics and Science.”

In conclusion, they state that:

(Earth Sciences) programs are of good quality as demonstrated by the recent significant growth in their student enrolment. The faculty are dedicated educators producing graduating cohorts that meet APGO (Association of Professional Geoscientists of Ontario) certification requirements. The students are appreciative of the quality education that they receive with the vast majority indicating that if the clock were turned back they would again choose the Department of Earth Sciences at Brock.

C. Opportunities for Improvement and Enhancement

The reviewers provided nine discrete recommendations. The recommendations have been re-ordered to accommodate ARC's responses.

1. Earth Sciences should be permitted immediately to hire a tenure track Assistant Professor in the field of Economic Geology to fill a major gap in program delivery.

In its response, the Department noted:

This has been our highest priority for four years, in light of the substantial demand for geologists in the mining industry, and of course, in light of our ever-increasing enrolments and low faculty complement (given the number of people in administrative roles and with teaching release for various other reasons) which has necessitated the high number of courses taught on overload.

The Dean of Mathematics and Science concurred, stating that:

The Dean's Office acknowledges that the Department's need for faculty resources is acute. Our recent decision to hire a faculty member in a Limited Term Appointment (LTA) in Economic Geology will address this need. The position will also contribute to a new MSc program, currently being developed. Success of this new program and continued growth in undergraduate and graduate enrollments will make a strong case to convert this position to tenure-track.

The Dean of Graduate Studies and the Senate Graduate Studies Committee also agreed with this recommendation, stating that the appointment would allow for enhancement of the graduate program by creating capacity for more research, supervisory duties and revenue.

An LTA position has been approved and posted as a three year term appointment with possible conversion to a tenure-track position. ARC concludes that this recommendation has been accepted and implemented.

Implementation Plan

ARC notes that this recommendation has been implemented and no further action is required at this time.

6. There needs to be greater cooperation with the Department of Geography.

The Department, Dean of Graduate Studies and Dean of Mathematics and Science all agreed with this recommendation.

The Dean of Graduate Studies stated, "It is suggested that this is a critical step from the graduate studies perspective."

ARC considers the recommendation (that discussion be initiated and facilitated regarding the future direction of both departments) has been accepted. The Dean of Social Sciences stated that "[G]reater cooperation between ERSC and GEOG should be discussed first. Then if some basic understandings and agreements can be reached perhaps development of a joint graduate program might follow from that." The Department of Geography stated that the Department "interprets this as graduate-level cooperation *not undergraduate*."

Implementation Plan (First Priority)

Responsible for approving:	Departments of Earth Sciences and Geography
Responsible for resources:	Departments of Earth Sciences and Geography
Responsible for implementation:	Chairs of Earth Sciences and Geography
Timeline:	Deans of Mathematics and Science and Social Sciences to report by the end of the 2012-13 academic year

2. Earth Sciences must strengthen its M.Sc. program by increasing the number of graduate student enrolments.

The Department responded by saying, “the implementation of this recommendation relies on resources that are beyond our ability to control - primarily funding.” They also noted “Our high teaching load...reduces our research output and competitiveness in grant applications.”

In response to the reviewer’s various suggestions on increasing the number of graduate student enrollments, the Department stated:

We are willing to explore closer ties with the Department of Geography (for a joint MSc program) and with other departments in the faculty of Mathematics & Science...It must be kept in mind that responsibilities by cross-appointed members in other departments can take time, effort, and funds away from our department unless judiciously exercised.

The Dean of Mathematics and Science agreed that the MSc Program in Earth Sciences needed to be strengthened by recruiting more students. Increasing the number of graduate student enrollments through developing a joint MSc program with the Department of Geography was, he said, “desirable”, but added that it was:

unlikely to increase enrollments substantially. Other actions must also be taken to increase graduate enrollments...includ(ing) more active recruitment initiatives, advertising and promotion of the research training opportunities in the Department of Earth Sciences...and improve(d) success with NSERC applications.

The Dean of Graduate Studies concurred with the Faculty Dean on the above points, adding:

The suggestion of some cooperative efforts...with the Department of Geography, and perhaps the new Centre for Environmental Sustainability, is well supported by the Faculty of Graduate Studies.

ARC considers that the recommendation (to increase enrolments in the graduate program) has been approved in principle. Collaboration with the Department of Geography might be one approach, among other strategies, to achieve this objective. The Chair of Geography stated, “GEOG agrees that it is in the interest of its physical geographers (PGs) to investigate formal, graduate affiliation with ERSC.” The Dean of Graduate Studies

suggested that renewed efforts by both Departments were required to strengthen the MSc program.

Implementation Plan (First Priority)

Responsible for facilitating:	Dean of Graduate Studies
Responsible for approving:	Department of Earth Sciences
Responsible for resources:	Dean of Mathematics and Science
Responsible for implementation:	Dean of Mathematics and Science/Department of Earth Sciences
Timeline:	Dean of Mathematics and Science to report by the end of the 2012-13 academic year

3. The strengthening of the Earth Sciences M.Sc. program as recommended above should be viewed as the first step towards eventual establishment of a proper earth sciences PhD program.

The Department responded:

We trust that with continued faculty renewal, and more time provided to faculty to pursue their research at a funding-competitive level, a PhD program will be a realistic goal for the future.

The Dean of Mathematics and Science concurred that a PhD program was possible:

...if MSc enrollments are enhanced and if faculty resources are sufficient to manage the workload necessary...We encourage the Department to restructure its offerings in order to address its problem with overload teaching.

The Dean of Graduate Studies added:

Graduate Studies would prefer to monitor the progress of the Master's program, either altered from its present form, or a new program joint with Geography, before entering into such discussions.

The Senate Graduate Studies Committee stated that it "agrees with the reviewers that ERSC should make major strides to expand their graduate studies into a PhD."

ARC views the introduction of a PhD program in Earth Sciences to be not immediately feasible but the potential for such a program should be considered as part of the Four-Year Review. Therefore, ARC considers the recommendation regarding the PhD program to be not accepted at this time.

Implementation Plan

Recommendation NOT accepted at this time.

4. ERSC delivers too many courses in relation to the number of the available teaching faculty. The undergraduate program must be rationalized, streamlined and modernized to minimize the number of course overloads taught by faculty members.

In its response, The Department indicated that it “accept(s) as desirable on the whole” the proposal, “to eliminate all non-required courses for Association of Professional Geoscientists of Ontario (APGO) accreditation in both Environmental Geosciences and Earth Sciences programs.” At the same time it stated that, “we are unlikely to agree to eliminating all of the specialty offerings that we truly value, and that serve as recruiting channels for honours and graduate students.” The Department was also willing “to explore ways in which we could expose our students to geostatistics”.

The Dean of Mathematics & Science concurred, stating that the “Associate Dean, Undergraduate Programs, has begun discussions with the Faculty of Social Sciences and the Department of Geography to facilitate cooperation”. He also noted that, “The Department of Mathematics has interest in mounting and offering a *Geostatistics* course.”

The Dean of Graduate Studies noted that “the program needs to ensure that there are sufficient courses being offered for the Master’s program to thrive”.

The Senate Graduate Studies Committee agreed that “the undergraduate curriculum needs to be restructured to allow faculty more time for research and working with graduate students.”

The Senate Undergraduate Program Committee supported the recommendation.

ARC accepts the recommendation (that a full-scale curriculum review take place which will involve a thorough review of the purpose and relevance of courses and programs in Earth Sciences) has been accepted and is in the process of implementation. The Committee recognizes that the practice of cross-teaching involving members from the Department of Geography will be reviewed during that review. The Department of Geography stated, that it “will struggle to meet the requirements of its BSc program with reduced resources” should Earth Sciences reduce teaching in physical geography.

Implementation Plan (First Priority)

Responsible for approving:	Department of Earth Sciences
Responsible for resources:	Department of Earth Sciences
Responsible for implementation:	Chair of Earth Sciences
Timeline:	Dean of Mathematics and Sciences to report by the end of the 2012-13 academic year

5. Earth Sciences needs to develop a strategic plan to help them identify and prioritize strategic objectives.

The Department responded:

We plan to meet following the appointment of the Economic Geologist in order to produce short-term and long-term objectives for everything from curriculum review and the formulation of a course-based MSc program in Economic Geology to the gradual replacement of resources (including faculty and staff).

The Dean of Mathematics and Science and the Dean of Graduate Studies fully supported this recommendation.

ARC considers this recommendation to be accepted and in the process of implementation.

Implementation Plan (Second Priority)

Responsible for approving:	Department of Earth Sciences
Responsible for resources:	Department of Earth Sciences
Responsible for implementation:	Chair of Earth Sciences
Timeline:	Dean to report by end of the 2013-14 academic year

7. The antiquated undergraduate teaching microscopes must be replaced as soon as possible.

The Department agreed, noting that “the limited numbers of both petrographic *and* palynological microscopes are already restricting enrolments in several courses..We have discussed the possibility of targeted fund-raising in the past (in part with the advancement officer) and will bring some of these to fruition as quickly as possible.”

The Dean of Mathematics and Science stated that “The Department of Earth Sciences should prioritize its equipment needs in support of its efforts to modernize its programs.”

The Dean of Graduate Studies noted that “potential graduate students today explore what is available to them as tools to do potential research, and therefore, if this is an issue/impediment to the graduate program, Graduate Studies would urge the Faculty and University towards alleviating the problem.”

ARC considers this recommendation to be accepted and in the process of implementation.

Implementation Plan (First Priority)

Responsible for approving:	Dean of Mathematics and Science and Department of Earth Sciences
Responsible for resources:	Dean of Mathematics and Science and Office of Advancement
Responsible for implementation:	Dean of Mathematics and Science and Office of Advancement
Timeline:	Dean of Mathematics and Science to report by the end of the 2012-13 academic year

8. Communication between the Library staff and Earth Sciences should be improved.

The Department stated, "We agree, and consider the recent Learning Commons initiative by Ian Gordon to highlight earth sciences research is a step in this direction."

Both the Dean of Graduate Studies and the Dean of Mathematics and Science supported this recommendation.

The University Librarian stated "It is possible that in its current form, this very brief statement could be interpreted to mean that there are communication problems between the Library and Earth Sciences, and that of course is not the case."

ARC considers this recommendation to be accepted and in the process of implementation.

Implementation Plan (First Priority)

Responsible for approving:	University Librarian, Dean of Mathematics and Science, Department of Earth Sciences
Responsible for resources:	Dean of Mathematics and Science
Responsible for implementation:	University Librarian, Dean of Mathematics and Science
Timeline:	Dean of Mathematics and Science to report by the end of the 2012-13 academic year.

9. Earth Sciences needs to capitalize on its unique position as the only full service earth science department in the region to continue to expand undergraduate enrolment to take advantage of the high quality employment opportunities available for students in industry.

The Department agreed that:

outreach programs are desirable, but demand considerable investment from an already overworked faculty...We could tap into our contacts (including former graduates) in local schools in order to re-establish more structured outreach program for local schools, but would require some assistance (e.g. funds for student assistants).

The Dean of Mathematics and Science stated that he “appreciate(s) the Department’s efforts in outreach activities. We encourage them to solidify such efforts and are willing to help.”

The Dean of Graduate Studies stated that “Graduate Studies is planning to conduct a marketing survey in order to develop additional recruitment strategies. Graduate Studies would welcome any input/suggestions from ERSC regarding what the program feels will/might work from the faculty/program perspective.”

ARC considers this recommendation to be accepted and in the process of implementation.

Implementation Plan (Second Priority)

Responsible for approving:	Dean of Graduate Studies, Department of Earth Sciences
Responsible for resources:	Dean of Graduate Studies
Responsible for implementation:	Dean of Graduate Studies, Chair of Earth Sciences
Timeline:	Dean of Mathematics and Science to report by the end of the 2013-14 academic year

D. Recommendations to be Implemented

The IQAP requires that ARC “set out and prioritize the recommendations that are selected for implementation.” Using the specific ARC proposals enunciated above, the following priorities are proposed:

First Priority:

Recommendations 2, 4, 6, 7, and 8.

Second Priority

Recommendations 5 and 9.

Implemented Recommendations

Recommendation 1.

E. Recommendations that Will Not be Implemented

Recommendation 3.

January 11, 2013