



# Four Year Report (2024) Earth Sciences Graduate & Undergraduate Programs (reviewed 2019/2020)

## A. Summary of Review

1. This review was conducted under the terms and conditions of the IQAP approved by Senate on May 25, 2016.
2. The Review Committee consisted of two external reviewers: Janok Bhattacharya (McMaster University) and Mostafa Fayek (University of Manitoba) and an internal reviewer, Mark Spencer (Brock University).
3. The site visit occurred on June 24-25, 2020, via video conference.
4. The Final Assessment Report was approved by Senate on November 18, 2020.
5. The academic programs offered by the Department of Earth Sciences which were examined as part of the review are listed below, with the reviewers having assigned the following outcome categories:

Program (s)	Excellent Quality	Good Quality	Good Quality with Concerns	Non-Viable
MSc			X*	
BSc (Honours) Earth Sciences			X*	
BSc (Honours) Earth Sciences Co-op			X*	
BSc (Honours) Environmental Geoscience		X		
BSc (Honours) Environmental Geoscience Co-op		X		
BSc (Honours) Combined		X		
BSc (with Major) Earth Sciences		X		
BSc (with Major) Environmental Geoscience		X		
BSc (Pass)		X		
Minor		X		

*\*The Reviewers indicated that their concerns were mostly related to enrolment and faculty resources. They acknowledged that the programs are in strong competition for students and suggested some new strategies to enhance enrolment. The Reviewers also suggested that the Department hold a retreat and develop a strategic plan for the future, including faculty renewal and maximizing available resources fairly.*

6. The next review of the undergraduate programs in the Department of Earth Sciences will be in 2027/28.

## B: Recommendations

### Recommendation #1

Unit should define their strategic niche, especially in the context of competition with other universities in southern Ontario. Emphasis could be in Environmental geoscience, Quaternary geology, Palynology, remote sensing, in conjunction with Geography appointments, and linked to planetary science.

### ARC Disposition of the Recommendation

ARC considers the recommendation to be accepted and in the process of implementation. The Committee recognizes that the Department has already taken steps toward occupying a niche, such as the proposal for a new BA in Earth and Planetary Science Communication, which is undergoing the review process in 2020. The Committee expects that the definition of a strategic niche will require a number of years of development by the Department.

### Implementation Plan (3<sup>rd</sup> Priority)

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2022/23.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Revision of new BA program in progress; introduction of micro-certificate.	2021	2023

### Explanation of Actions Taken, Status and Results:

The Department introduced a micro-certificate in 2021.

The Department has developed a new, unique BASc program in Earth and Planetary Science Communication, which has accepted its first cohort in the fall of 2023.

To further emphasize its existing strengths the Department will change its name to the **Department of Earth and Planetary Sciences**. This brief will be completed by spring of 2024. After consultations with and the endorsement of Dean Berg, the Department, in collaboration with the Department of Geography and Tourism Studies will be developing an Environmental Sciences program. The SOI will be completed by spring 2024 with a full proposal brief to be completed by spring of 2025.

These actions will further define our strategic niche.

**Recommendation #2**

Unit should develop a 5-10 year hiring strategy, focused on their strategic niche as well as possible future retirements. The rationale for each hire should be justified based on the unit's own strategic plan as well as linked to the overall mission and strategic university plans.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to develop a 5-10 year hiring strategy to be accepted and in the process of implementation. The Committee recognizes that hiring lies outside of its jurisdiction and expects that the Department will proceed through normal channels of advocacy for faculty resources.

**Implementation Plan (1<sup>st</sup> Priority)**

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2020/21.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Hydrologist is top priority; detailed plan to wait until retreat.	2021	Ongoing

**Explanation of Actions Taken, Status and Results:**

The Department has a clear replacement strategy. Replacement requests 2 and 3 would serve our existing Professional Geoscientists Ontario (PGO) BSc programs, our BASc program and our future Environmental Sciences program. Our replacement strategy will no doubt be influenced by the development of the Environmental Sciences program; hence we consider this item to be ongoing. We understand that the current fiscal position of the University makes filling these requests difficult and we will continue to file these requests in the future.

Conversion of Dr. Biagi's LTA into a Tenure stream position remains a priority.

Due to Dr. Finn's retirement on June 30, 2023, and his salary line reverting to FMS, the Department had submitted a replacement request for a Planetary Scientist with expertise in planetary igneous processes. This position will be required for both PGO-compliant programs as well as for the BASc.

The 2023/24 academic year will be the last year of employment for Dr. Cheel, our sedimentologist, who is on a phased-retirement plan. As we clearly outlined in a previously submitted replacement request, Sedimentology is a core discipline among the knowledge requirements of the PGO for both the Earth Science as well as the Environmental Science streams. Sedimentary processes also play an important, though specialized role, shaping the surfaces of other terrestrial planets and icy worlds.

Dr. Brand has opted for the 3-year phased-retirement starting July 1, 2023. Requests will be made for positions, though the nature of these requests will depend on the greatest need at the time.

In summary, the Department has a strategy to strengthen its “niche” as outlined in recommendation #1.

The program is operating under institutional constraints outside of its control; however, these constraints and their outcomes will compromise the program’s ability to offer core courses on a consistent basis, thereby affecting pre-requisites and flow through, with consequent delays in program completion.

### Recommendation #3

The unit should investigate increasing opportunities for international enrollments, especially in niche areas (such as palynology) that can service an international need. Perhaps consider developing a 2+1 or 2+2 program. The aim should be to increase international students by 5-10.

### ARC Disposition of the Recommendation

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

#### Implementation Plan (1<sup>st</sup> Priority)

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2020/21.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Discussion about niche programs ongoing, international student program plan delayed.	2020	Ongoing

### Explanation of Actions Taken, Status and Results:

To attract international students and provide Geoscientists with existing degrees with an overview of modern and innovative techniques in several focused areas, the Department had planned to develop an 8-month certificate program. Such a program would be unique and would surely go towards further defining our “niche”. However, such a program will only work if the courses promoted within it can be offered on a regular basis. The Environmental Sciences program may also provide the Department with opportunities to increase international enrollment. However, the nature of such opportunities will depend on the details of the program and the faculty complement.

The current uncertainty in the status of the faculty complement prevents us from being able to offer such a certificate. Hence the development of this certificate is currently paused.

**Recommendation #4**

Examine strategies to increase undergraduate enrollment, and especially recruitment from 1<sup>st</sup> year students that transfer into the program, emphasizing niche areas of expertise.

**ARC Disposition of the Recommendation**

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

**Implementation Plan (1<sup>st</sup> Priority)**  
 Responsible for approving: Department  
 Responsible for resources: Department  
 Responsible for implementation: Department  
 Timeline: Dean of Mathematics and Science to report by the end of academic year 2020/21.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Changed admission requirements, added micro-certificate, revision for new program ongoing.	2021	2024

**Explanation of Actions Taken, Status and Results:**

The Department changed our admission requirement to align them with those of competing departments in Ontario. We are offering a unique BAsC program. We are in the final stage of completing an articulation agreement with Flemming College to provide a pathway for students with a diploma as Geological Technician.

To attract more majors from local high schools, we have increased our advertising efforts. These efforts consist of increased presence in social media, an improved departmental website and includes a mailing campaign of promotional posters to approximately 150 high schools in our primary catchment area.

We believe these efforts have paid off as our major registrations increased from 11 in 2022 to 29 in 2023 and current applications are above last year's.

**Recommendation #5**

Recommend a facilitated retreat to address recommendations 1, 2, 3 and 4. Retreat should include participation of jointly and cross-appointed faculty, especially in physical geography.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be accepted and in the process of implementation. The Committee understands that a Departmental retreat is just one of the options available in taking steps to address recommendations 1,2,3 and 4.

**Implementation Plan (3<sup>rd</sup> Priority)**

Responsible for approving:	Department
Responsible for resources:	Department
Responsible for implementation:	Department
Timeline:	Dean of Mathematics and Science to report by the end of academic year 2022/23.

Actions Taken	Year Action Started	Year Action Completed
Action #1 Retreat delayed until post-pandemic.	2021	2021

**Explanation of Actions Taken, Status and Results:**

The Department held a virtual retreat on December 13, 2021, as a result we deem this item to be closed.

We have regular interactions with members of the Geography and Tourism Studies Department. Our BASc was revised by a committee that included members of the Geography and Tourism Studies Department and we anticipate extensive discussions as we proceed with the Environmental Sciences proposal.

**Recommendation #6**

We recommend that Brock University establish a student-supervisor agreement that is reviewed by both the student and supervisor at the start of the student's graduate program.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be already current practice at Brock. The Committee expects that the Department will benefit from ongoing efforts by the Faculty of Graduate Studies and the Centre for Pedagogical Innovation to improve and streamline these practices.

**Implementation Plan**

No action required.

**Recommendation #7**

The Department should develop an NWS that is reflective of the workload required in both undergraduate and graduate teaching and mentoring.

**ARC Disposition of the Recommendation**

ARC considers the recommendation to be not accepted as it lies outside the jurisdiction of the Committee.

**Implementation Plan**

Recommendation not accepted.

**C. Unit Summative Analysis and Evaluation****1. To what extent has the Department achieved the improvements suggested by the reviewers?**

The Department's efforts to achieve improvement have clearly resulted in increased enrollments (see recommendation 4). We are continuing to develop our niche by changing the departmental name and taking the lead in developing a new environmental sciences program. The effects of COVID (lockdown, reduced enrollments, financial difficulties) have clearly affected the rate at which we have been able to proceed. However, the new BASc program has now accepted its first cohort, which met the University intake target of 5 majors. We expect intake to increase as the program is now, for the first time, prominently featured in the Brock University View Book 2024 that is used for recruitment. It should be noted that the program is featured for both the Faculty of Mathematics and Science (FMS) and the Faculty of Social Sciences (FOSS). In addition, enrollment in our BSc programs have this year exceeded University targets, from 11 in 2022 to 24 in 2023. BSc offers in the current year are similar to last year's values.

**2. What overall impact has it had on the Department's programs?**

The review has helped the Department focus on making positive changes. It reinforced our commitment to develop the unique BASc program as well as a microcertificate. We remain interested in developing a specialized 8-month certificate program which is primarily aimed at international students, though it may also appeal to Canadian Geoscientists who want to upgrade their PGO credentials. Our interactions with the Department of Geography and Tourism Studies Department have deepened and we look forward to jointly working with them on the new Environmental Sciences program.

**3. How is the Department adopting a process of continuous quality improvement for its programs?**

We continuously evaluate our programs. This was directly written into the program proposal brief for the BASc program and it will similarly be part of the Environmental Sciences brief. As the Department faces several additional retirements in the next two years, continuing to improve our offerings for our majors will be our priority, with a clear need for faculty renewal.

#### 4. How well do the programs now align with Brock University strategic priorities?

Our programs align well with the University's strategic priorities. Testimonials of our alumni on our website clearly indicate that our existing BSc program provided them with a *“transformational .... academic and university experience”* as well as jobs, with the PGO-compliant program a major advantage to our graduates in the job market. Our BAsC and the new Environmental Sciences program will provide students with unique student experiences as both will be rooted within the faculties of FMS and FOS.

#### 5. How does this review and its results position the programs as the Department moves into the next review cycle?

While the Department clearly faces challenges with respect to the replacements, we believe that the future for the Department can be very positive. Majors in PGO-based BSc and Environmental Science programs will continue to be able to find well-paying jobs and we anticipate that enrollments will grow. The prime reason why there are traditionally few majors in PGO-related programs is that the senior high school course, SES4U Earth and Space Sciences, is not offered in many high schools. Our advertising campaign should address that. Anecdotal evidence of feedback from Ontario Universities' Fair indicates that demand for Environmental Science majors is strong. Multiple advisors who attended the Fair reported that they fielded numerous requests for such a program. Hence, we expect demand to be strong. Similar anecdotal evidence suggests that our BAsC major will find excellent career paths as the Department has already had requests to pass on career opportunities to recent graduates. Hence, we expect that graduates in that program will also have employment opportunities.

As mentioned above, retirements, combined with institutional constraints compromise the Department's ability to reliably offer core courses consistently. While the Department can make accommodations in the short-term, the challenges will continue to increase in the future as more retirements are scheduled to take place. Without replacements there is a danger that the Department will be unable to offer students appropriate paths to program completion before the next review.

In summary, assuming that faculty replacements will have been granted in time for the next review, we anticipate the Department to be well positioned.

### D. ARC Final Summary

In final summary of the 2019/20 cyclical academic review of the programs offered by the Department of Earth Sciences, ARC has determined the following:

1. That the Reviewers' Recommendations have been addressed satisfactorily.
2. That the Department has established a direction for next steps as it prepares for the next review cycle.
3. That the Department has achieved a broad-based, reflective, and forward-looking self-assessment.