

**GEOLOGY/GEOPHYSICS
GRADUATE PROGRAMS
Final Assessment Report &
Implementation Plan
September 2020**

Faculty / Affiliated University College	Faculty of Science	
Degrees Offered	Geology M.Sc, Ph.D. Geophysics M.Sc, Ph.D.	
Date of Last Review	2011-2012	
Approved Fields	Earth and Planetary Systems Earth Evolution: Surface, Life and Climate Resource Geoscience Tectonic Processes and Crustal Dynamics	
External Consultants	Lee Groat	University of British Columbia
	Russell Pysklywec	University of Toronto
Internal Reviewers	Denise Connelly	Associate Dean, Health Sciences
	Seva Ioussoufovitch	Ph.D. Biomedical Engineering Candidate
Date of Site Visit	March 10 and 11, 2020	
Date Review Report Received	May 4, 2020	
Date Program/Faculty Response Received	June 8, 2020	
Evaluation	Good Quality with report 2 years (October 2022)	
Approval Dates	SUPR-G: October 19, 2020 SCAPA: October 28, 2020 Senate (FYI only): November 13, 2020 This section will be completed by SGPS or Associate University Secretary	
Year of Next Review	Year of next cyclical review 2027-2028	

Overview of Western's Cyclical Review Assessment Reporting Process

In accordance with Western's Institutional Quality Assurance Process (IQAP), the Final Assessment Report (FAR) provides a summary of the cyclical review, internal responses, and assessment and evaluation of the graduate programs in **Geology (M.Sc, Ph.D.) and Geophysics (M.Sc, Ph.D) in the Department of Earth Sciences, Faculty of Science.**

This report considers the following documents:

- i) the programs' self-studies,
- ii) the external consultants' report, and
- iii) the response from the Department.

This Final Assessment Report (FAR) identifies the strengths of the program as well as opportunities for program enhancement and improvement; details and prioritizes the recommendations of the external consultants; and prioritizes those recommendations that are selected for implementation.

The Implementation Plan details the recommendations from the Final Assessment Report that are necessary for implementation; identifies who is responsible for approving and acting on the recommendations; outlines any action or follow-up that is required; and provides the timeline for completion.

The Final Assessment Report and Implementation Plan is sent for approval through SUPR-G, SCAPA, Senate, and the Ontario Universities' Council on Quality Assurance. It is made available on a publicly accessible location on Western's IQAP website. The Final Assessment Report with the Implementation Plan is the only document resulting from the graduate cyclical review process that is made public; all other documents are confidential to the Program/School/Faculty and SUPR-G.

Executive Summary

The Geology Department admitted its first graduate students in 1944 while Geophysics began its graduate program in 1957. In 1993, the departments merged to become the Department of Earth Sciences. In total, there have been more than 750 masters and doctoral graduates from both programs. Interdisciplinarity is the central tenet that brought the two departments together as their research is thematic rather than discipline based.

There are four approved fields of study:

1. Earth and Planetary Systems

2. Resource Geoscience
3. Tectonic Processes and Crustal Dynamics
4. Earth Evolution: Surface, Life and Climate Crustal Dynamics

Masters students may choose the course-based (1 year) or a thesis-based stream (2-year), while PhD students follow the traditional 12-term or 4-year program, with completion of a dissertation as a requirement for graduation.

Throughout both programs, students frequently collaborate with the Departments of Applied Mathematics, Biology, Chemistry, Geography, Anthropology, Physics & Astronomy, and Civil & Environmental Engineering.

In addition to their regularly earned Master's or Doctoral degrees in Geology or Geophysics, students may also participate in a "Collaborative Specialization". Approved Collaborative Specializations for Geology/Geophysics students include:

- Environment and Sustainability
- Planetary Science and Exploration
- Global Health Systems in Africa
- [Hazards, Risks and Resilience](#) (New Sept 2020)

Also, the Department offers two combined graduate programs in partnership with the Faculty of Law: 1) a combined JD/MSc program in which students complete both degrees in three (versus four) years (https://www.uwo.ca/earth/graduate/future_students/index.html); and 2) a Graduate Diploma in Mining Law, Finance, and Sustainability, an 8-month (two term) program (Sept – April) that can be completed as full- or part-time study (https://law.uwo.ca/future_students/graduate_programs/graduate_diploma_in_mining_law_finance_and_sustainability.html).

The Earth Sciences graduate programs actively encourage Masters and PhD students to begin thinking about their aspirations and opportunities after graduation as soon as they enter graduate studies by recommending that students participate in professional development sessions, offered by CTL and SGPS, as well as attending a weekly colloquium series featuring academic and industry speakers who are leaders in the field. Students are regularly funded by supervisors to present at various conferences and all students are provided transportation and registration to the annual Earth Sciences Conference in Toronto. Student retention is high and times to completion are similar to peer programs.

Review Process

During the external review, the review committee, comprised of two external reviewers (U Toronto, UBC), one internal reviewer (Associate Dean, Health Sciences) and a doctoral student (Engineering candidate), was provided with Volume I and II in advance of the onsite visit and then met over two days with:

- Vice Provost & Associate Vice Provost, School of Graduate & Postdoctoral Studies (SGPS)
- Vice Provost, Academic Planning, Policy and Faculty Relations (Western)
- Associate Dean, Graduate & Postdoctoral Studies, Faculty of Science
- Associate Dean, Research, Faculty of Science
- Department Chair, Graduate Chair & Associate Chair, Department of Earth Sciences
- Graduate Faculty, Department of Earth Sciences
- Curator, Geosciences Collections, Faculty of Science
- Infrastructure Chair, Faculty of Science
- Associate Librarian, STEM Discipline Coordinator, Teaching & Learning
- Administrative Staff, Department of Earth Sciences
- 15 Graduate Students, Department of Earth Sciences

The reviewers also observed the physical spaces and facilities that support graduate courses and research, including graduate student offices and workspaces, experimental labs, analytical facilities, machine shop, and rock/mineral collections.

Following the onsite review visit, the External Consultants submitted a comprehensive report of their findings which was sent to the Graduate Chair, Department of Earth Sciences and the Dean, Faculty of Science for review and response. These formative documents, including Volumes I and II of the Self-Study, the External Report, and the Department/ Faculty response, have formed the basis of this summative assessment report of the Geology/Geophysics graduate programs.

Summative Assessment – External Reviewers’ Report

Strengths of the Program

- Learning Outcomes for both Geology and Geophysics - “clearly observable and measurable in the structure of Earth Sciences graduate programs”
- Clear curriculum mapping and program development; curriculum content well-designed through course offerings; transparency in course requirements and assessment methods
- Stellar group of faculty members across the 4 fields who work well together and complement each other’s strengths
- High research productivity by faculty and graduate students as evidenced by publications and grants
- Collegial and academically stimulating culture/community
- High level of satisfaction among graduate students
- Strong leadership
 - i) structure is efficient and well-managed;
 - ii) department has been responsive to and acted upon recommendations from previous reviews;
 - iii) ongoing regular evaluation of programs with faculty retreats, student meetings, for example.

- Excellent quality of students; admissions consistent with similar units across U15
- Sufficient resources to support the program
- Industry-supported research chairs

Areas of Recommendation

- Maintaining research strength in all fields with pending retirements
- Graduate student funding:
 - i) lack of funding for entering students with averages below 75%
 - ii) maintaining equitable funding with similar programs in Canada
 - iii) targeted scholarships to enhance funding for students
 - iv) communication and clarity of funding package to graduate students
- Viability of combined graduate program, JD/MSc Law and Geology/Geophysics
- Value of Graduate Seminar for PhD students
- Content of short courses – determining which are optimal for student learning in that format
- Ensuring regular annual graduate committee meetings for all students
- Department should develop a strategic plan to replace 2012 plan

Summary Statement by the Reviewers

In summary, based on the metrics and other information gathered during the review, the Review Committee is of the opinion that the Department of Earth Sciences at Western is a nationally and internationally-leading research unit with high quality graduate programs. Students, faculty, and staff alike speak of it as a collegial and academically stimulating environment for graduate research. Almost universally they expressed a deep interest and engagement in being part of the department and a desire to continue to build its research successes. The research excellence and high research productivity of the faculty are shared by their graduate students.

Reviewers’ Recommendations & Program/ Faculty Response

REVIEWERS’ RECOMMENDATION	PROGRAM RESPONSE
1. Funding amounts, sources, and terms should be clearly communicated to students by letter.	Departmental Graduate Affairs Committee to address - the letter of offer is in SGPS-approved format; committee will be charged with developing a recommendation for letter content to improve clarity and be flexible to accommodate changing tuition, for example

REVIEWERS' RECOMMENDATION	PROGRAM RESPONSE
<p>2. Review admission/funding practices to ensure there is not a tiered system where students entering with lower academic average marks can be denied funding. Funding should remain commensurate with cost of living and similar graduate programs in Canada.</p>	<p>Clarification – all first year graduate students are funded upon acceptance into the program; 2 years of funding for Masters and 4 years for PhD students. Students must maintain a 78% average or higher to be eligible for a TA position and maintain this funding source. Students are funded by their supervisor when they are admitted with grades below the admission cut-off.</p>
<p>3. The Graduate Committee should review the viability of the J.D./M.Sc. Law and Geology/Geophysics program and discuss strategies to enhance visibility and strengthen the program.</p>	<p>In progress – joining with Faculty of Law in recruitment efforts; Graduate Committee will work with Dr. Elizabeth Steyn, Cassels Brock Fellow in Mining and Finance Law (Western Faculty of Law) to determine the best method to promote the joint J.D./M.Sc. program during the Fall of 2020</p>
<p>4. The department should become more involved in monitoring annual graduate student committee meetings.</p>	<p>In progress – Fall 2020, Graduate Chair will lead creation of an internal reporting database to be updated and checked by Department Program Coordinator and adoption of SGPS online <i>Pathfinder</i> for PhD and MSc (once available)</p>

REVIEWERS' RECOMMENDATION	PROGRAM RESPONSE
<p>5. The Graduate Committee should review the short course offerings in the department to ensure that the academic goals are being met and whether delivery in the form of a short course is optimal.</p>	<p>Under consideration - ...<i>"There is only 1 regular short course (Introduction to Planetary Science) and typically 1 other short course per year. There are several reasons that we have been teaching short courses: i) <u>Scheduling</u>. The Introduction to Planetary Science Short Course has students from 5 departments and ideally needs to be offered as they enter the program. Requiring a full-term course would be difficult considering the different number and types of courses required in different departments. ii) <u>Industry Collaboration</u>. The short duration of short courses enables participation from industry. Giving our students the opportunity to work together with industry participants provides them with crucial employment connections. iii) External Student Participation. The short courses allow students from outside Western to participate. In the last 4 years, out of the 155 students who took our short-courses 48 were non-Western students. This highlights our department as the place to go for expertise in various subdisciplines, which in turn, helps with recruitment of future top-quality students."</i></p>
<p>6. Consideration should be given to making the Seminar Course a full year and expanding the scope as suggested by the graduate students.</p>	<p>Under consideration – <i>"The mandatory... course ...has drawn both positive and mixed reactions from our graduate students. ...[D]ue to the diverse background and level of preparation of our graduate students, it is not easy to deliver a course that can satisfy the needs of everyone, and thus compromises have to be made. The Graduate Seminar course counts as a 0.5 credit course...towards the course requirements for both MSc and PhD degrees. Expanding this course to a full year will preclude some of the graduate students taking other specialized courses."</i></p>
<p>7. The Department should develop a strategic plan, especially with respect to faculty renewal.</p>	<p>In Progress, with anticipated completion date of Winter 2021</p>

Implementation Plan

The Implementation Plan provides a summary of the recommendations that require action and/or follow-up. The Graduate Program Chair and/or Department Chair/Director, in consultation with SGPS and the Dean of the Faculty will be responsible for enacting and monitoring the actions noted in the Implementation Plan. The details of progress made will be presented in the Dean’s Annual Planning Document.

Recommendation	Proposed Action and Follow-up	Responsibility	Timeline
1. Funding amounts, sources, and terms should be clearly communicated to students by letter.	The Program will develop a Funding Letter and establish processes for its preparation and communication to students	Graduate Committee	Fall 2020; New Funding Letter to be included in 2021 admissions process
2. The Graduate Committee should review the short course offerings in the department to ensure that the academic goals are being met and whether delivery in the form of a short course is optimal.	The Graduate Committee will conduct a thorough review of the short courses offered by the Department to ensure that they meet the criteria for learning outcomes. The offering of short courses can be minimized to only courses that deliver a specialized content required by our graduate programs.	Graduate Committee	Fall 2020; Course modifications incorporated for Fall 2021.
3. Consideration should be given to making the Seminar Course a full year and expanding the scope as suggested by the graduate students.	The Graduate Committee will review of the format of the Seminar Course, in relation to graduate student feedback, to ensure that it optimally meets the learning outcomes.	Graduate Committee	Fall 2020; Course modifications incorporated for Fall 2021.
4. The Graduate Committee should review the viability of the J.D./M.Sc. Law and Geology/Geophysics program and discuss strategies to enhance visibility and	The Graduate Committee will work with Dr. Elizabeth Steyn, Cassels Brock Fellow in Mining and Finance Law (Western Faculty of Law) to determine the best method to promote the	Graduate Committee	Fall 2020; incorporated for Fall 2021.

Recommendation	Proposed Action and Follow-up	Responsibility	Timeline
strengthen the program.	joint J.D./M.Sc. program during the Fall of 2020		

Other Opportunities for Program Improvement and Enhancement

None.

Personnel Issues (Confidential and If Applicable)

None.