



UNIVERSITY OF ICELAND

Faculty of Earth Sciences

SCHOOL OF ENGINEERING AND NATURAL
SCIENCES

SELF-REVIEW REPORT



December 2020





UNIVERSITY OF ICELAND

Introduction

In accordance with the Icelandic Quality Enhancement Framework at the University level in Iceland and the University of Iceland's Guidelines for the organization, schedule and process of institution-led review of faculties and interdisciplinary programs, the Faculty of Earth Sciences (the Faculty), School of Engineering and Natural Sciences (the School), University of Iceland (the University), carried out self-evaluation during the spring semester of 2020, with some work extending into the autumn due to delays caused by the Covid-19 pandemic. The results are presented in this report. A self-evaluation committee was established in January 2020.

The committee members were:

1. Cécile Adélie Ducrocq, PhD Student Representative
2. Eniko Bali, Associate Professor
3. Esther Rut Guðmundsdóttir, Associate Professor
4. Freysteinn Sigmundsson, Head of Faculty (from 1st of July 2020)
5. Herdís Helga Schopka, External Representative
6. Ingibjörg Þórðardóttir, BS Student Representative
7. Íris Hrönn Guðjónsdóttir, School's Infrastructure Manager
8. Jacqueline Grech Licari, MS Student Representative
9. Magnús Tumi Guðmundsson, Professor, Former Head of Faculty, Committee Chair
10. Steffen Mischke, Professor

As part of the Self-Review, each student representative formed a discussion group to meet with the Social Sciences Research Institute to answer questions and discuss relevant matters. Each discussion group consisted of diverse selection of five to six students under the relevant graduate level.

The Committee used results of the data collection from the University's databases and the course catalogue, students' satisfaction results and focus groups' results, along with its own discussion and ideas to develop actions for improvement. The University of Iceland Centre for Teaching and Learning reviewed the Faculty's course catalogue descriptions, especially learning outcomes, and provided the Committee with that review.

The external representative attended Committee meetings, including during the visit of the international external experts, and provided comments that have been incorporated into the report.

This material was remotely reviewed by the international experts on October 20 – 24, 2020 including on-line meetings with the Committee members. These were:

1. David Pyle, Professor of Earth Science at the University of Oxford (UK)
2. Nigel Mason, Professor of Molecular Physics at the University of Kent (UK)
3. Outi Savolainen, Professor Emerita of Ecology and Genetics at Oulu University (Finland)

The international expert reviews were used to refine and finalize the resulting recommendations represented in this report.

Faculty Characteristics

The Faculty of Earth Sciences (the Faculty) is one of six faculties in the School within the University. It offers BS, MS and PhD degrees in geology (including geochemistry), geophysics and the third subject field is earth sciences, offered for MS and PhD and is the option used for students who have backgrounds in other, related fields and pursue graduate studies in the Faculty (Appendix 1, Table 1). In addition, the Faculty has relatively large numbers of overseas exchange students, coming for 1-2 semesters through exchange programs such as Erasmus. This relative size of this group has over the last 20 years had considerable effect on things such as courses on offer and the language used for teaching in the latter part of the BS program.

A critical factor in the relative strength of earth sciences at the University of Iceland is the existence of the Institute of Earth Sciences (IES), an autonomous part of the University's Science Institute. There are currently 12 such academic positions manned but the hiring process is ongoing with one additional position. The academic research staff take full part in the faculty administration, including having full voting rights at faculty meetings. IES provides research facilities for all staff and graduate students.

The administration of the Faculty is in the hands of the Faculty Head, the Faculty Council and Faculty Meetings. The Faculty of Earth Sciences and the Institute of Earth Sciences share a common board. The Faculty Council without the student representatives serves as the board of IES. The Faculty Council consists of the head, deputy head, and a separately elected member of Faculty, two student members and three academic representatives elected by staff of the IES. Faculty meetings are the highest authority on academic matters that the Faculty has jurisdiction over. This includes setting regulations within the Faculty, electing the Faculty leadership, defining new academic positions and replacements, and setting a policy for the faculty. The Teaching Committee is the venue of teaching staff and student representatives to discuss teaching matters. The Committee makes recommendations to the Faculty Council on distribution of teaching, discusses changes and updates to the teaching program and provides a forum for discussion on various issues relating to the content of the programme and courses.

In 2019 the Faculty had 13 academic teaching positions with one temporary lecturer, resulting in teaching duties amounting to 13.49 full time equivalent, FTE (Appendix 1, Table 2). Including the temporary lecturer (male), the gender ratio was 7 males and 7 females in October 2019. Out of the 48 sessional teachers, 29 are males and 19 females. The gender balance is thus over all very close to parity and in accordance with the Equal Rights Law of Iceland and the gender equality policy of the University.

The average number of students for the period 2015-2019 is 183, split between BS, MS and PhD studies with about 100 BS-students and about 80 graduate students (Appendix 1, Table 3). The number of students graduating with a degree in geology and geophysics has been fluctuating through the years, while a long-term trend of increasing number of graduations is apparent at all levels, although a distinct peak in BS graduations occurred a few years after

the financial crisis in 2008. Most students conducting a full BS study are Icelanders, however, every year we have large number of exchange students. In contrast students in our graduate programme are very diverse by nationality. In our MS study programme currently we have students from 15 different countries and approximately half of the enrolled students are Icelandic. 54 students graduated with an MS degree in Geology, Geophysics and Earth Sciences from the Faculty of Earth Sciences between 2016 and 2019. These students originated from 18 different countries. Only 39% of the students graduating with an MS degree in this period were Icelanders. 21% of the international MS students arrived from the European Economic Area (EEA), whereas 40% of the students came to our faculty to conduct MS studies from outside of EEA. A large number (26%) of international students have studied for their MS degree with us in collaboration with the United Nations University. These students started their studies in Iceland within the United Nation's Geothermal Training Programme. We plan to keep this diversity in our MS programme.

The diversity in terms of nationality is similarly large in our PhD programme. Between 2016 and 2019, 26 students graduated with a PhD degree in Geology or Geophysics from the Faculty of Earth Sciences. These students originated from 11 different countries. Only 34% of the graduated PhD students are Icelanders in this period. Most of the international PhD students arrived from the EEA, but four students came to follow PhD studies from the United States and one from Kenya. The currently enrolled student group is similarly diverse, and we plan to keep this diversity in our PhD programme.

On 20 October 2020 the total number of students registered in the Faculty was 164, thereof 75 undergraduate students, 67 master students, and 22 PhD students.

Summary and Main Conclusions for the Faculty

Lessons learned from QEF1

The QEF1 Review in 2013 had 40 recommendations/action items. One item was a comprehensive review of teaching in geology at BS-level. This was carried out in 2014-2015 and resulted in considerable changes that were subsequently modified in 2017. Out of the 40 actions we regard that 19 were completed and carried out, 14 have been partly completed and 7 have not been acted on or not completed. The majority of the tasks completed were carried out in the first 1-3 years after the review. The changes to programme content and e.g. administration of programmes that took place in the latter part of the period that has passed since 2013, have mostly not been directed according to points in QEF1, but they have been broadly in line with the recommendations made.

The 19 items completed cover a wide range, including aspects of internal quality control, aspects of undergraduate teaching, such as content of the BS geology programme (e.g. more relevant maths, physics, and chemistry). For the MS-programme, the points implemented included formal welcome meetings, enhanced structure to the programme and introducing small grants to cover essential costs of the MS-projects. In the PhD programme student-supervisor contracts were implemented. When it came to exposure and participation of research, GoogleScholar profiles for staff were made mandatory. Points on better facilities for microscopy and GIS teaching were implemented.

The 14 partly completed items included things not fully in the hands of the faculty (e.g. using a four semester system), while others have been hampered by budgetary considerations such as increasing the number of courses at MS-level. Issues such as homogenizing the conditions for all PhD students is not a simple matter as funding of individual programmes varies a great deal. An effort to increase access to international journals had limited success.

Seven action items were not implemented. These were in the end not considered of sufficient priority to put into action even though they were not controversial (e.g. use peer evaluation in teaching and exposing the students better to the professional world). Some have not materialized as other activities are considered to cover the essential aspects. An example here was the item on lectures by faculty members aimed at students, as IES-Nordvulk already has a weekly lecture series.

Teaching and Learning

Students at all levels (BS, MS and PhD) participate in the regular assessment of teaching at the faculty and the resulting improvement measures by the involvement of six representatives with full voting rights at Faculty Meetings. Students have two representatives with full voting rights in the Faculty Council, one undergraduate student and one graduate student. Thus, students have direct influence during the discussions of the study programmes and related affairs.

Formal teaching evaluation surveys are carried out twice every semester. Firstly, a short survey is conducted mid-way through each semester and then a larger survey is carried out at the end of each semester. In these surveys, conducted over the whole University and

administered centrally, the evaluations of students on teaching, organisation and teachers are collected. The results are reviewed at Faculty Meetings and the findings discussed by faculty leadership with student representatives. Poor marks are acted upon by consultation with teachers and students and have led to changes and reorganisation of courses and study plans. Overall, FES average grades are above the average for the School. The students at all levels are satisfied by the scientific knowledge of staff and other professionals who teach courses or supervise students. Furthermore, they are generally satisfied with the diverse teaching and assessment methods used by the faculty and the accessibility of state-of-the-art equipment for research, during study and project works.

Based on an assessment of the student satisfaction surveys, the overall satisfaction with our Geology and Geophysics BS programme is above the average of the School and the university, partially due to improvements implemented since the last Self-evaluation report in 2013. However, there is potential for improvement, of which the implementation of active engagement with companies and institutions where our graduates may potentially work has high priority. In this respect we should consider student visits at these external entities and inviting guests from these units to increase awareness of students and prepare them for work after graduation. Furthermore, we should ensure that Icelandic students receive well-balanced training in the use of both Icelandic and English languages to enable efficient and appropriate professional communication in both languages. Specifically, geophysics students seek currently more help to develop their communication skills. We also need to address better ways to raise consciousness of equality within earth sciences and our teaching at all levels.

Based on the student satisfaction surveys the overall satisfaction with our MS programme is below the average of the School and the university, and the main concern of the students is the course organization and course selection. This is partially caused by the high number of courses cancelled, sometimes in the last moment, due to general budget cuts at the university. We try to come over this problem by significant restructuring of the programme, which has been done in collaboration with the teachers and student groups in spring 2020. Now, the majority of courses are taught in the autumn, allowing students to do their courses in the first, second and third term of their studies, and the project work partly during semesters two and three, and then in a focussed manner in the fourth and final semester. The changes have been implemented with the start of the fall term in August 2020, and it remains to be seen how these measures enhance the quality of the study programme and related student satisfaction in the future. We need to further clarify the role of faculty coordinator in MS studies and pave ways for more efficient supervision of MS students. This might be done by wider-scale involvement of industry partners in the final project work, and a more structured communication between students, supervisors and faculty coordinators.

The student satisfaction surveys indicate that the overall satisfaction of PhD students with our programme is similar to the average of the School and the university. The main concern of the students is the quality of the project's supervision, which in their opinion, is highly variable within the faculty. Thus, an improved dialogue between students and supervisors is required, and better monitoring of the establishment of PhD contracts implemented since the last Self-evaluation report is aimed for. Further, we need to ensure that both students and supervisors

are sufficiently trained, that existing guidelines are regularly examined and adjusted if necessary, and also consequently followed. PhD studies can also be improved by appropriate training of field and lab safety at the beginning of studies and a better accessibility of relevant safety documents in English and Icelandic.

Management of Research

Research strategy is described in vision/strategy for the Faculty of Earth Sciences and the Institute of Earth Sciences approved in June 2020 (see Appendix 3). Together, the Institute of Earth Sciences and Faculty of Earth Sciences focus on research in Earth sciences within the broad framework of three main themes:

- Volcanoes
- Environment, climate and sustainability
- Crustal and mantle processes

Research is emphasized in key areas where full use can be made of the natural laboratory provided by Iceland and its surrounding area. Important research is, however, carried out in other fields, and researchers have full academic freedom in selecting research topics (in line with academic freedom being one of three values of University of Iceland;

https://english.hi.is/sites/default/files/atlitivr/pdf/hi21_brochure_ens-01-web.pdf).

Connections across the themes and cross-disciplinary work in all fields are strived for. The aim is to strengthen research and teaching in the areas of environmental change, climate-change related topics and the sustainable development goals of the United Nations. The aim is also to maintain and widen the scope for Nordic collaboration in volcanology and other broadly related areas. The management of research outputs follows the procedures of University of Iceland, such that researchers provide a yearly report on their publications that is an important part of the evaluation of both individual researchers (influences salaries) and the overall funding to the faculty. New publications are listed on the web site of the Institute of Earth Sciences (<http://earthice.hi.is/>). There is no central facility to store open access version of scientific papers, but researchers are encouraged to make papers available in that form. There is also no central facility to store data reported in scientific publications. External support to research is in the form of international and national funding to research projects (see Appendix 1, Table 4). Since 2002, the number of academic staff within Earth Sciences at University Iceland has been in the range 26-29 persons. Research of the group largely relates to the unique location of Iceland representing a natural laboratory, although studies are also carried out around the world. Research impact of the faculty relates to our good publication record: In recent years the combined number of reviewed scientific papers (listed in Web of Science) published annually by academic staff in Earth Sciences is 70, with over 3000 yearly citations. There is also service to society e.g. in the form of research related to natural hazards in Iceland. Faculty members are active in providing advice to civil protection, authorities, and the general public via media appearances. They are also active in other science-societal issues, such as climate change with e.g. a faculty member being one of the lead authors of the 6th IPCC report on climate change due to be published in 2021.

Follow-up Processes

The implementation of the Action Plan will be a standing item on meetings of the Faculty Council and similarly the Faculty Head will report on the progress regularly to the School Board. Faculty Head reports formally to the School Dean on the status of the implementation and plans for next year together with other relevant QA matters no later than 1 December and this will be followed up in the School Board. The School Dean subsequently makes use of this report in a status report for all Faculties in the School, which will be submitted to the Quality Committee no later than 15 January. The Quality Committee writes a short report to the Rector no later than 1 February, which will subsequently be discussed in a meeting between the Chair of the Quality Committee, the Director of Quality Management and Rector, Vice-Rectors, Deans of Schools and the Managing Director of the Central Administration.

Appendix 1. Key Figures.

Table 1. Overview of present Study Programmes within the Faculty

Name of Study Programme	Cycle ¹	Degree	Credits (ECTS)
JAR266 Geology	1.2	BS	180
JAR431 Geology	2.2	MS	120
JAR561 Geology	3	PhD	180
JED231 Geophysics	1.2	BS	180
JED441 Geophysics	2.2	MS	120
JED561 Geophysics	3	PhD	180
JVI441 Earth Sciences	2.2	MS	120
JVI561 Earth Sciences	3	PhD	180

¹ See National Qualification Framework for Higher Education No. 530/2011.

Table 2. Faculty members as of 1 October 2019 and sessional teachers 2018, number (No.) and full time-equivalent (FTE).

	Male		Female		Total	
	No.	FTE	No.	FTE	No.	FTE
Professors	5	5.00	3	3.00	8	8.00
Associate Professors	1	1.00	3	3.00	4	4.00
Assistant Professors	0	0.00	1	1.00	1	1.00
Adjunct Lectures	1	0.49	0	0.00	1	0.49
Total	7	6.49	7	7.00	14	13.49
Sessional teachers	29	3.37	19	1.45	48	4.82

Table 3. Total number of students, number of entrants, retention rate for first year, and completion rate (4 year mean 2015-2018).

Programme	No. of students			No. of entrants ³	Retention rate	No. of graduates	Completion rate ⁴
	Total no.	Full time ¹	Part time ²				
JAR266	89	71	15	14	87	18	79
JAR431	37	23	9	12	83	10	95
JED231	15	9	6	3	83	5	92
JED441	7	5	1	3	93	3	100
JVI441	5	3	1	2	67	1	75
JAR561	18	15	-	3	-	3	67
JED561	9	8	-	2	-	2	78
JVI561	3	3	-	1	-	0.5	50

¹ > 22.5 ECTS completed. For PhD students > 1 ECTS completed.

² 1-22 ECTS completed.

³ For all programmes except PhD, no. of students completing at least one examination in first term.

⁴ 2-year rate for diploma, 4-year rate for B.A./B.S., 3-year rate for M.A./M.S., 5-year rate for PhD.

Table 4. Research output of Faculty members, based on the Evaluation System for the Public Universities in Iceland, expressed by mean total research points (A) and mean research points from peer-reviewed publications only (B) per FTE.

	2015		2016		2017		2018		Mean	
	A	B	A	B	A	B	A	B	A	B
Faculty	65.4	50.0	53.0	42.8	44.0	34.1	50.8	40.6	53.3	41.9
School	43.4	32.4	39.0	29.7	39.1	27.5	39.2	30.9	40.2	30.1
University	37.8	24.7	37.1	25.1	34.8	22.8	37.8	26.4	36.9	24.8

Appendix 2. Action Plan for Teaching and Learning and Management of Research in QEF2

	Actions	Deliverable	Deadlines	Responsible party
--	---------	-------------	-----------	-------------------

1. FACULTY LEVEL

Ch. 1.2	Faculty Characteristics			
1	Seek ways to fill gaps in teaching positions in important fields such as seismology and other fields in accordance the joint policy of FES and IES with prioritisation updated annually.	Requests to THE SCHOOL and Dean	Annually 1 Dec	Head, Faculty Meeting
2	Distribute the role of course tutor (course supervision) more evenly between teachers than is done now.	Decision on changes in distribution of tasks	1 April 2021	Head, Deputy head, Teaching committee, Faculty board
3	Yearly review of program conducted in October, forms basis for any changes in the course catalogue for the following academic year.	Timely annual update of course catalogue	Annually 1 Nov.	Deputy Head
4	Seek ways to enhance the access of all to international journals.	Analysis of access and identification of gaps	1 May 2021	Head, Faculty Board
5	Analysis of facilities for lab-, field- and computing work for BS, MS, PhD, Postdoc and general research. Identify gaps and seek ways for improvement where needed.	Report with recommendations	1 May 2021	Head, Chairman IES Board

2. STUDY PROGRAMMES

2.1 BS in Geology (180 ECTS)

Ch. 2.1.1	Students			
1	Implement active engagement with companies and institutions where our graduates work, consider student visits and other ways to increase awareness of students and prepare them for work after graduation.	List of actions on engagements relating to specific courses.	1 March 2021	Deputy Head, teaching committee

Ch. 2.1.2	Teaching and Learning			
1	Teaching in the undergraduate programme should ensure that students get their training in Icelandic and with sufficient training in English to be able to communicate professionally in both languages. Guidelines on how to achieve this should be implemented and a system monitoring how they are followed.	Guidelines on how to use both English and Icelandic in courses.	1 February 2021	Deputy Head, teaching committee
2	Carry out curricular mapping for BS-geology and BS-geophysics	Curricular map	1 April 2021	Deputy Head, teaching committee
3	Increase vocational training and writing skills within the geology and geophysics programmes	Adding vocational and writing assignments into courses in geophysics	1 April 2021	Deputy Head Teaching Committee
4	Implement an action that addresses consciousness of equality within earth sciences and our teaching at all levels.	Changes to content of selected courses.	1 October 2021	Deputy head, teaching committee
5	A course in computer science/programming should be included as mandatory in the geology BS-programme.	Changes to list of mandatory courses	1 March 2021	Head, Deputy Head, teaching committee
6	BS-geophysics: Strengthen dialog and interaction between the student group and teachers, with the aim of finding ways to harmonize the work in courses in the Faculty of Science and the Faculty of Earth Sciences	Recommendations on possible changes to course content and course selection	1 March 2021	Head, Teaching Committee

2.2 BS in Geophysics (180 ECTS)

Ch. 2.2.1	Students			
1	Implement active engagement with companies and institutions where our graduates work, consider student visits and other ways to increase awareness of students and prepare them for work after graduation.	List of actions on engagements relating to specific courses.	1 March 2021	Deputy Head, Teaching Committee

Ch. 2.2.2	Teaching and Learning			
1	Teaching in the undergraduate programme should ensure that students get their training in Icelandic and with sufficient training in English to be able to communicate professionally in both languages. Guidelines on how to achieve this should be implemented and a system monitoring how they are followed.	Guidelines on how to use both English and Icelandic in courses.	1 February 2021	Deputy Head, Teaching Committee
2	Carry out curricular mapping for BS-geology and BS-geophysics	Curricular map	1 April 2021	Deputy Head, Teaching Committee
3	A course in computer science/programming should be included as mandatory in the geology BS-programme.	Changes to list of mandatory courses	1 March 2021	Head, Deputy Head, teaching committee
4	Implement an action that addresses consciousness of equality within earth sciences and our teaching at all levels.	Changes to content of selected courses.	1 October 2021	Deputy Head, Teaching Committee
5	Increase vocational training and writing skills within BS-geophysics	Adding vocational and writing assignments into courses in geophysics	1 April 2021	Deputy Head Teaching Committee
6	BS-geophysics: Strengthen dialog and interaction between the student group and teachers, with the aim of finding ways to harmonize the work in courses in the Faculty of Science and the Faculty of Earth Sciences	Recommendations on possible changes to course content and course selection	1 March 2021	Head, Teaching Committee

2.3 MS in Geology, Geophysics and Earth Sciences (120 ECTS)

Ch. 2.3.1	Students			
1	Identify aspects of the MS programme that require improvement and actively address each issue in a timely manner. This includes better organization of welcoming and reception, involvement of the	Report on aspects of the MS programme that require improvement	1 Nov annually	Head and Deputy Head

	student organization, balance of M and F courses, ensure use of contracts and that they are followed, consider more even distribution of responsibility for MS-courses, enforce that course time-schedules i.e. 7 or 14-week courses are followed.			
2	Clarify the role of faculty coordinator for all staff and students. This includes enhanced guidance in course and project selection. Ensure appropriate training for staff appointed as faculty coordinators.	Information distributed	1 May annually	Graduate study committee
Ch. 2.3.2	Teaching and Learning			
1	Carry out curricular mapping for MS-programmes	Curricular map	1 April 2022	Deputy Head, Teaching committee
2	Ensure sufficient and appropriate project supervision by faculty staff.	Internal faculty guidelines on MS supervision	1 Feb 2021	Head, Faculty
3	Look into ways to increase more participation of specialists at other institutions and companies in MS-student project supervision.	List of opportunities for MS projects, including those with external supervision	1 Sept 2021	Head, Faculty
4	Enhance teacher-student dialog, feedback and communication in the MS-programme.	Recommendation for enhancing teacher-student dialog, feedback and communication in the MS-programme	Biannually, within first 4 weeks of each semester	Head
5	Consider ways of stimulating academic discussion and interaction within the MS-student group	Recommendation for stimulating academic discussion and interaction within the MS-student group	Biannually, within first 4 weeks of each semester	Head

2.4 PhD in Geology, Geophysics and Earth Sciences (180 ECTS)

Ch. 2.4.1	Students			
1	Ensure that present framework and regulations are followed	Quality check of PhD program procedures	Biannually, middle of semester	Head

	in PhD guidance and supervision			
2	Clarify the role of faculty coordinator in the PhD studies who should be appointed timely and be exterior to the PhD committee.	Information distributed	1 Dec annually	Graduate study committee
Ch. 2.3.2	Teaching and Learning			
1	Improve the level of supervision through training and exposure to advances in supervision framework.	Report on opportunities	Annually 15 Jan	Deputy head, teaching committee
2	Improve possibilities for students and staff to enhance knowledge required for successful PhD work and their well-being.	Report on opportunities	Annually 15 Jan	Deputy head, teaching committee
3	Consider ways of stimulating academic discussion and interaction within PhD-student group.	Plan of stimulating academic discussion and interaction within the MS-student group, following meeting of Head and PhD-student group	Biannually, within first 4 weeks of each semester	Head
4	Improve and follow guidelines on lab and field access. Ensure proper training at beginning of studies and availability of all safety documents in English and Icelandic. Remove any obstacles that may exist in present system.	Clear safety guidelines for all students and staff: information distribution	Biannually, within first 2 weeks of each semester	Head
5	Clarify the role of PhD-students as assistant teachers (guidelines) and ensure training is available for new teaching assistants.	Internal faculty guidelines on teaching assistants.	Biannually, within first 4 weeks of each semester	Deputy head