Assessment report
Limited Framework Programme Assessment

Bachelor Earth Sciences

Utrecht University

Contents of the report

1. Executive summary

In this executive summary, the panel presents the main considerations which led to the assessment of the quality of the Bachelor Earth Sciences programme of Utrecht University, which has been assessed according to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, as published on 20 December 2016 (Staatscourant nr. 69458).

The programme objectives are relevant and sound. The panel appreciates the programme aiming to educate students in the full breadth of the Earth Sciences domain. The panel regards the programme objectives to be strong and pronounced on students' research competencies.

The programme objectives correspond to domain-specific reference framework for the Earth Sciences programmes. The panel welcomes the efforts by the joint Earth Sciences programmes in the Netherlands to draft this framework and regards this to be the sound and up-to-date description of the domain.

The panel welcomes the comparison of the programme to other programmes in the Netherlands. This comparison highlights the programme profile.

The panel is positive about students being prepared for the master programmes in this domain, be it that some students may enter the labour market. The panel supports programme management's plans to revive the External Advisory Board.

The programme intended learning outcomes meet the programme objectives. The panel welcomes the programme intended learning outcomes having been aligned with important European frameworks for Earth Sciences programmes, as this testifies to the international status of the programme. The intended learning outcomes are comprehensive and conform to the bachelor level.

The panel is positive about the admission requirements applied by the programme and about the well-organised admission procedures. The panel appreciates the Summer course on mathematics for incoming students with Mathematics A certificates.

The panel ascertained the curriculum to meet the programme intended learning outcomes. The courses are up to standard. The panel appreciates the breadth of the curriculum, allowing students to gain knowledge and skills in the programme domain fundamentals and to be educated thoroughly in the mathematics, physics and chemistry disciplines. Research is covered very strongly. Students are trained in academic skills appropriately. The curriculum is up-to-date. The study paths and the integrating Fieldwork courses markedly contribute to the curriculum coherence. The panel suggests, however, to prevent overlap of courses. The Bètaplus option and Geosciences Honours College offer students interesting opportunities to expand the curriculum, especially in the natural sciences.

The panel regards the lecturers in the programme to be very skilled and to be very motivated to teach in the programme. Lecturers are clearly involved in research in the programme domain. The panel welcomes the very substantial proportions of lecturers being BKO- or SKO-certified, testifying to their educational capabilities. The panel notes the lecturers' workload to be challenging but to be appropriately managed.

The educational concept and study methods are very adequate. The panel greets the system of continuous assessment. The panel suggests avoiding to extend this system to prevent increasing too much the staff workload. The number of hours of face-to-face education is favourable. Although the students-to-staff ratio could point to large classes, students experience in tutorials, practical classes and during fieldwork rather small-scale education. The panel notes the programme to have been adapted to the rather diverse group of incoming students, allowing students to gain required levels, including mathematics and physics levels. The panel is very positive about the organisation of study guidance in the programme. The student success rates of the programme are definitely appropriate, but drop-out rates in the first year are relatively high. Therefore, the panel proposes to monitor drop-out rates.

The examination and assessment policies for the programme are in line with Faculty policies. The panel considers the assessment system of the programme to be very solid. The panel regards the Board of Examiners to be in control of the programme examinations and assessments. The measures taken by the programme to ensure the validity and transparency of examinations and the reliability of assessments are very much up to standard.

The examination methods adopted in the programme are adequate and consistent with the goals and contents of the courses. The panel is positive about the various examinations scheduled in the courses.

Students are offered appropriate supervision in the Bachelor Thesis projects. The assessment processes are adequate, involving two examiners and being conducted using elaborate rubrics scoring forms.

The Bachelor Thesis projects are up to standard. They match the intended learning outcomes of the programme. The panel supports the grades given by the programme examiners.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to enrol in master programmes in this domain. The panel appreciates graduates being admitted to a wide range of master programmes, both within the programme domain and in adjacent domains.

The panel which conducted the assessment of the Bachelor Earth Sciences programme of Utrecht University assesses this programme to meet the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, judging the programme to be satisfactory. Therefore, the panel advises NVAO to accredit the programme.

Rotterdam, 25 March 2019

Prof. dr. ir. A. Veldkamp
(panel chair)

drs. W. Vercouteren
(panel secretary)

2. Assessment process

The evaluation agency Certiked VBI received the request by Utrecht University to organise the limited framework programme assessment process for the Bachelor Earth Sciences programme of this University. The objective of the programme assessment process was to assess whether the programme would conform to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, published on 20 December 2016 (Staatscourant nr. 69458).

Having conferred with management of the Utrecht University programme, Certiked invited candidate panel members to sit on the assessment panel. The panel members agreed to do so.

The panel composition was as follows:

- Prof. dr. ir. A. Veldkamp, dean ITC Faculty of Geo-Information and Earth Observation, University of Twente, the Netherlands (panel chair);
- Drs. T.M. van Daalen, director Geological Survey of the Netherlands, Netherlands Organisation for Applied Scientific Research, the Netherlands (panel member);
- Prof. dr. P.A. van der Beek, full professor, Institut des Sciences de la Terre, Université Grenoble Alpes, France (panel member);
- Prof. dr. ir. N.E.C. Verhoest, associate professor, Department of Environment, Ghent University, Belgium (panel member);
- I.S. van Essen, student Bachelor Earth Sciences, Minor Solid Earth, VU Amsterdam, the Netherlands (student member).

On behalf of Certiked, drs. W. Vercouteren served as the process coordinator and secretary in the assessment process.

All panel members and the secretary confirmed in writing being impartial with regard to the programme to be assessed and observing the rules of confidentiality. Having obtained the authorisation by the University, Certiked requested the approval of NVAO of the proposed panel to conduct the assessment. NVAO has given its approval.

To prepare the assessment process, the process coordinator convened with management of the programme to discuss the outline of the self-assessment report, the subjects to be addressed in this report and the site visit schedule. In addition, the planning of the activities in preparation of the site visit were discussed. In the course of the process preparing for the site visit, programme management and the Certiked process coordinator regularly had contact to fine-tune the process. The activities prior to the site visit have been performed as planned. Programme management approved of the site visit schedule.

Well in advance of the site visit date, programme management sent the list of final projects of graduates of the programme of the last two years. Acting on behalf of the assessment panel, the process coordinator selected the theses of fifteen graduates from the last few years. The grade distribution in the selection was ensured to conform to the grade distribution in the list, sent by programme management.

The panel chair and the panel members were sent the self-assessment report of the programme, including appendices. In the self-assessment report, the student chapter was included. In addition, the expert panel members were forwarded a number of theses of the programme graduates, these theses being part of the selection made by the process coordinator.

Well before the site visit date, the assessment panel chair and the process coordinator met to discuss the self-assessment report provided by programme management, the procedures regarding the assessment process and the site visit schedule. In this meeting, the profile of panel chairs of NVAO was discussed as well. The panel chair was informed about the competencies, listed in the profile. Documents pertaining to a number of these competencies were presented to the panel chair. The meeting between the panel chair and the process coordinator served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs.

Prior to the date of the site visit, all panel members sent in their preliminary findings, based on the self-assessment report and the final projects studied, and a number of questions to be put to the programme representatives on the day of the site visit. The panel secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions with the programme representatives during the site visit.

Shortly before the site visit date, the complete panel met to go over the preliminary findings concerning the quality of the programme. During this meeting, the preliminary findings of the panel members, including those about the theses were discussed. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were discussed as well.

On 22 January 2019, the panel conducted the site visit on the Utrecht University campus. The site visit schedule was as planned. In a number of separate sessions, the panel was given the opportunity to meet with Faculty Board representatives, programme management, Board of Examiners members, lecturers and final projects examiners, and students and alumni.

In a closed session at the end of the site visit, the panel considered every one of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented a broad outline of the considerations and conclusions to programme representatives.

Clearly separated from the process of the programme assessment, assessment panel members and programme representatives met to conduct the development dialogue, with the objective to discuss future developments of the programme.

The assessment draft report was finalised by the secretary, having taken into account the findings and considerations of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited the final report. This report was presented to programme management to be corrected for factual inaccuracies. Programme management were given two weeks to respond. Having been corrected for these factual inaccuracies, the Certiked bureau sent the report to the Board of Utrecht University, to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO:	B Earth Sciences (B Aardwetenschappen)
Orientation, level programme:	Academic Bachelor
Grade:	BSc
Number of credits:	180 EC
Specialisations:	None
Location:	Utrecht
Mode of study:	Full-time (language of instruction Dutch/English)
Registration in CROHO:	21PD-56986
Name of institution:	Utrecht University
Status of institution:	Government-funded University
Institution's quality assurance:	Approved

4. Findings, considerations and assessments per standard

4.1 Standard 1: Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings
The Bachelor Earth Sciences programme is one of the programmes of the Faculty of Geosciences of Utrecht University. The Dean of the Faculty is responsible for all programmes of the Faculty. The programme is part of the Undergraduate School of Geosciences, being chaired by the Vice-Dean of Education of the Faculty. The organisation, delivery and quality assurance management of the programme rest with the Teaching Institute of Earth Sciences. This institute falls under the responsibility of the Department of Earth Sciences and of the Department of Physical Geography. These Departments are responsible for both research and education in the Earth Sciences and Physical Geography domains within the Faculty. Programme staff members are employed by these Departments. The Teaching Institute Board is chaired by the programme director, being responsible for this programme and for the Master Earth Sciences programme. For this Bachelor programme, he is assisted by the programme coordinator. The Bachelor Education Council, being composed of three staff members and three students, advises programme management on programme quality assurance issues. For all programmes of the Faculty, the Faculty Board of Examiners has the authority to assure the quality of examinations and assessments. For this programme, the Chamber Earth Sciences of the Board of Examiners in particular monitors examinations' and assessments' quality.

The Bachelor Earth Sciences programme of Utrecht University is a three-year, research-based, academic bachelor programme in the multi-disciplinary Earth Sciences domain. In the programme, the effects of the Earth system and processes on life on Earth are studied. The programme aims to study planet Earth from system perspective, including processes within and between Geosphere, Hydrosphere, Atmosphere and Biosphere, and the interaction between humans and the Earth system. The main programme objective is to acquaint students with the breadth of the domain. Students are educated to obtain basic knowledge, insight and understanding of the Earth, its evolution and associated processes across time and spatial scales, to gain knowledge and skills in research in this domain and to acquire academic skills in this field. In comparison to other programmes in the Netherlands, the Utrecht University programme may be characterised as aiming to study the full breadth of the domain and as giving ample room to mathematics, physics and chemistry.

The programme has been benchmarked against the Earth Sciences domain-specific reference framework, which has been drafted by the joint Earth Sciences programmes in the Netherlands. The objectives of the programme conform to this framework.

The programme primarily prepares students to continue their studies and to enrol in master programmes in Earth Sciences or related domains. Students may, however, enter the labour market as second-grade Geography teachers in secondary education or in junior positions in this field. Students do not often take the latter route. For the programme, the External Advisory Board, being composed of professional field representatives, has been put in place. The Board is, however, not very active. Programme management intends to revive the Board.

The programme objectives have been translated into the intended learning outcomes of the programme. These intended learning outcomes are extensive and grouped into both general and domain-specific learning outcomes. The general learning outcomes include acquisition, interpretation and conceptualisation of knowledge, analytical and critical thinking, communication skills, reflective attitude and learning skills. The domain-specific learning outcomes are, as the main points, knowledge and understanding of the programme domain, and knowledge of and skills in scientific research in the programme domain.

The intended learning outcomes of the programme have been aligned with the international Points of Reference for Degree Programmes in Earth Sciences for the bachelor level, these having been drafted as part of the Tuning Educational Structures in Europe project. To establish the bachelor level of intended learning outcomes, the benchmark against the Dublin descriptors for the bachelor level has been presented.

Considerations
The panel regards the programme objectives to be relevant and sound. The programme aims to introduce students to Earth Sciences domain-specific knowledge and understanding, knowledge and skills to do research in this domain and academic skills. The panel appreciates the programme aiming to educate students in the full breadth of the Earth Sciences domain. The panel regards the programme objectives to be strong and pronounced on students' research competencies.

The programme objectives correspond to domain-specific reference framework for the Earth Sciences programmes. The panel welcomes the efforts by the joint Earth Sciences programmes in the Netherlands to draft this framework and regards this to be the sound and up-to-date description of the domain.

The panel appreciates the comparison of the programme to other programmes in the Netherlands. This comparison highlights the programme profile.

The panel is positive about students being prepared for the master programmes in this domain, be it that some students may enter the labour market. The panel supports programme management's plans to revive the External Advisory Board.

The intended learning outcomes of the programme are in agreement with the programme objectives. The panel welcomes the programme intended learning outcomes having been aligned with important European frameworks for Earth Sciences programmes, as this testifies to the international status of the programme. The intended learning outcomes are comprehensive and conform to the bachelor level.

Assessment of this standard
These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be satisfactory.

4.2 Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings
The influx of students in the last few years declined from 181 incoming students in 2014 to 116 students in 2017 to rise again to 139 students in 2018. The vast majority of the incoming students have Dutch secondary school diplomas (vwo). Students with these diplomas, including Mathematics, Physics and Chemistry certificates, are admitted to the programme. Students with the Mathematics A certificate, being about 15 % to 20 % of total influx, are strongly advised to take the Summer course on mathematics before entering the programme. Applicants are obliged to attend the programme matching day, which is meant to inform them about the characteristics of the programme. Students with weaknesses in their prior education are given written advice or are invited for interviews.

The curriculum of the programme takes three years and carries 180 EC of study load. The programme presented tables, showing the mapping of the intended learning outcomes and the courses for each of the study paths offered in the curriculum. All intended learning outcomes are achieved by students in the major-compulsory courses, being the first-year courses, the second-year Fieldwork and the third-year Bachelor Thesis project. The curriculum structure conforms to the Utrecht University guidelines for Bachelor programmes, being major-compulsory courses (90 EC), major-restricted electives (45 EC), and optional courses (45 EC). Courses in the first year are offered at introductory level, second-year courses display higher levels of knowledge and understanding, and courses in the third year are taught at advanced bachelor level. The first year of the curriculum entirely consists of major-compulsory courses, being Earth Sciences courses and courses on mathematics, physics and chemistry. In the second and third year for the major-restricted electives, students are advised to take one out of six study paths. These paths reflect Earth Sciences themes. These themes are Dynamics of Solid Earth, Geology of Solid Earth, Sedimentary Geology and Evolution, Ocean and Climate, Earth, Water and Environment, and Earth Surface Dynamics. Students are allowed to select other options. Then, they will still need to comply with general regulations, for instance with regard to level requirements. For the optional courses in the second and third year, students may select courses of Utrecht University or other universities. At the end of both the first and second years, students do Fieldwork (15 EC each year), which is meant to integrate knowledge and skills acquired. At the end of the third year, students complete the Bachelor Thesis project, this being the individual research project in the curriculum. New trends, such as big data, are being introduced in the curriculum. Throughout the curriculum, students are exposed to research in the programme domain. Lecturers introduce current research. Students study academic papers. Research methods and techniques are part of courses. Students do research during Fieldwork and in the Bachelor Thesis project. Major courses in the curriculum address academic skills, such as critical attitude, problem solving skills, scientific writing skills and oral presentation skills. Internationalisation is pursued in the curriculum. Whereas in the first year, the programme is Dutch-taught, in the second and third years more and more courses are English-taught. About 10 % of the students spend part of the curriculum abroad. Students opting to become grade-two teachers in Geography in Dutch secondary education, take the education minor. Students preferring Mathematics and Physics, may take the BètaPlus option, allowing

them to replace courses by Faculty of Science courses. Talented students may opt for the Geosciences Honours College. These students take existing courses on higher level and additional courses.

The teaching capacity for the Bachelor and the Master Earth Sciences programmes is about 30 FTE. About 85 permanent staff members are involved in both programmes together. In addition, postdoctoral researchers, PhD students and teaching assistants assist in courses, during fieldwork and in practical classes. Lecturers are active researchers in their fields. They are members of the research institutes Earth Sciences or Physical Geography of the Faculty of Geosciences. Nearly all lecturers have PhD degrees. Of the total number of lecturers about 87 % are BKO-certified. The others are in the process of acquiring the certificate. About 46 % of the lecturers are SKO-certified. Lecturers experience the workload as challenging. More staff has been recruited. Lecturers discuss the programme both in formal meetings and informally. Students indicate to be very content about lecturers' performances and accessibility.

The educational concept of the programme is to encourage students to actively engage in the learning processes. To that end, activating study methods and continuous assessment are adopted. Continuous assessment means frequent assessments during courses to foster student learning processes. Study methods in the programme are lectures, tutorials, practical classes, and fieldwork. The programme is in the process of introducing blended learning. The students-to-staff ratio of the programme is about 31/1. In lectures, the class sizes may be large. In tutorials and practical classes and during fieldwork, the number of students is about 10 to 15 students per lecturer and/or teaching assistant. The number of hours of face-to-face education is about 24 hours per week in the first year, 19 hours in the second year and 12 hours in the third year. Study guidance is organised in tutor groups, being groups of 12 to 15 students. These groups are guided by a tutor, being one of the lecturers. Students may also turn to the student mentors. Tutors and mentors are most active in the first year, but may also be contacted in the second and third years. The programme study advisor monitors students' study progress, discusses study delays and is available in case of study problems. The drop-out rates for the programme for the last years are about 25 % in the first year. As these rates have risen over the years, the programme aims to redress this percentage. The student success rates are on average 43 % after three years and 82 % after four years (proportions of students re-entering in the second year, figures for last four to five cohorts). The latter proportion is better than the programme target figure of 75 %.

Considerations
The panel is positive about the admission requirements applied by the programme and about the well-organised admission procedures. The panel appreciates the Summer course on mathematics for incoming students with Mathematics A certificates.

The panel ascertained the curriculum to meet the intended learning outcomes of the programme. The courses are up to standard. The panel appreciates the breadth of the curriculum, allowing students to gain knowledge and skills in the fundamentals of the programme domain and to be educated thoroughly in the mathematics, physics and chemistry disciplines. The panel especially welcomes research being covered very strongly. Students are trained in academic skills appropriately. The panel considers the curriculum to be up-to-date. The study paths outlined in the curriculum and the integrating Fieldwork courses markedly contribute to the curriculum coherence. The panel suggests, however, to prevent overlap of courses. The

Bètaplus option and Geosciences Honours College offer students interesting opportunities to expand the curriculum, especially in the natural sciences.

The panel regards the lecturers in the programme to be very skilled and to be very motivated to teach in the programme. Lecturers are clearly involved in research in the programme domain. The panel welcomes the very substantial proportions of lecturers being BKO- or SKO-certified, testifying to their educational capabilities. The panel notes the lecturers' workload to be challenging but to be appropriately managed.

The panel regards the educational concept and study methods to be very adequate. The panel especially greets the system of continuous assessment. The panel suggests avoiding to extend this system to prevent increasing too much the staff workload. The number of hours of face-to-face education is favourable. Although the students-to-staff ratio could point to large classes, students experience in tutorials, practical classes and during fieldwork rather small-scale education. The panel notes the programme to have been adapted to the rather diverse group of incoming students, allowing students to gain required levels, including mathematics and physics levels. The panel is very positive about the organisation of study guidance in the programme, students being guided by staff members, senior students and having access to the programme study advisors. The student success rates of the programme are definitely appropriate, but the drop-out rates in the first year are relatively high. Therefore, the panel proposes to monitor drop-out rates.

Assessment of this standard
These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be good.

4.3 Standard 3: Student assessment

The programme has an adequate system of student assessment in place.

Findings
The examination and assessment procedures in the programme as well as the responsibilities of the Board of Examiners are governed by the Faculty of Geosciences Assessment Policy. As has been indicated, the Board of Examiners has the authority to assure the quality of examination and assessment processes of the programme. The Chamber Earth Sciences of the Board in particular monitors these processes. On behalf of the Board, the Assessment Committee reviews programme examinations and theses.

Examination methods in the programme are selected to conform to course goals. Multiple examinations are scheduled in all courses, to meet the diverse course goals and in line with the continuous assessment system of the programme. Examination methods include written examinations, written individual or group reports, papers or essays, oral presentations, practical assignments and homework assignments. At least one of the examinations is to be scheduled halfway through each of the courses. All examinations within courses have to be assessed at least satisfactory for students to pass. In case of unsatisfactory examinations, students are allowed repair tests, under specific conditions. Repair tests are graded no more than 6.

The Bachelor Thesis projects are individual scientific research projects. As part of the projects, students are required to do literature studies, perform laboratory work, analyse data, and process or model data. At the start of the projects, student and supervisor agree in writing to the process, including the research proposal, the planning and the hours to be spent. Students are entitled to supervision by staff members, who are researchers in the field. The Bachelor Thesis projects are assessed on a rather extensive list of assessment criteria, derived from the programme intended learning outcomes. The Thesis projects are assessed by the supervisor as well as by the second examiner, also being a staff member, on the basis of rubrics scoring forms.

In the programme, measures are taken to ensure the validity, reliability and transparency of examinations and assessments. The Board of Examiners appoints the examiners, who should be BKO-certified. The assessment plan for the programme allows for clear and reliable examinations and assessment, including quality assurance measures. For each of the courses, course dossiers have been compiled to document examinations and assessments of the courses. Course examinations are based upon test matrices, are peer-reviewed and include answer models. The validity of examinations and the reliability of assessments are analysed. The Assessment Committee, acting on behalf of the Board of Examiners, reviews regularly examinations and Bachelor Thesis projects. For the programme, policies on fraud and plagiarism are in place. Students are informed about these policies. Theses and other written reports are checked for plagiarism. The Board of Examiners handles cases of fraud or plagiarism and imposes sanctions.

Considerations
The panel considers the examination and assessment policies for the programme to be appropriate, these being in line with the Faculty policies. The panel considers the assessment system of the programme to be very solid. The panel regards the Board of Examiners to be in control of the programme examinations and assessments.

The panel approves of the examination methods adopted in the programme, these being consistent with the goals and contents of the courses. The panel is positive about the various examinations scheduled in the courses.

The supervision and assessment procedures of the Bachelor Thesis projects are appropriate. Students are offered appropriate supervision. The assessment processes are up to standard, involving two examiners and being conducted using elaborate rubrics scoring forms.

The measures taken by the programme to ensure the validity and transparency of examinations and the reliability of assessments are very much up to standard. The panel appreciates the numerous procedures having been adopted to ensure the quality of the examinations and assessments. The panel notes the examiners knowing these procedures and being prepared to work accordingly. The panel welcomes the Assessment Committee inspecting examinations and theses. The fraud and plagiarism formalities are up to standard.

Assessment of this standard
The considerations have led the assessment panel to assess standard 3, Student assessment, to be good.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings
The panel studied a total of fifteen Bachelor theses of graduates of the programme. The average grade for these projects is 7.6 for the years 2016, 2017 and 2018. About 40 % of the projects are graded with the mark 8.0 of more.

The programme graduates are admitted to a range of academic master programmes in this field, both of Utrecht University and of other universities in the Netherlands or abroad. Students are admitted to Utrecht University master programmes in Environmental Sciences, Climate Studies or Sustainable Development, but also to master programmes in Biology, Chemistry or Physics.

Considerations
The Bachelor Thesis projects are regarded by the panel to be up to standard. The theses match the intended learning outcomes of the programme. The panel supports the grades given by the programme examiners. The panel regards the Bachelor Thesis projects to be of appropriate quality and level.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to enrol in master programmes in this domain. The panel appreciates graduates being admitted to a wide range of master programmes, both within the programme domain and in adjacent domains.

Assessment of this standard
The considerations have led the assessment panel to assess standard 4, Achieved learning outcomes, to be satisfactory.

5. Overview of assessments

Standard	Assessment
Standard 1. Intended learning outcomes	Satisfactory
Standard 2: Teaching-learning environment	Good
Standard 3: Student assessment	Good
Standard 4: Achieved learning outcomes	Satisfactory
Programme	Satisfactory

6. Recommendations

In this report, recommendations by the panel have been listed. For the sake of clarity, these have been brought together below. These panel recommendations are the following.

- To prevent overlap of courses in the curriculum.
- To avoid extending the system of continuous assessment as it increases too much the staff workload.
- To monitor the drop-out rates in the programme, as these rates in the first year are relatively high and have risen over the years.

Assessment report
Limited Framework Programme Assessment

Master Earth Sciences

Utrecht University

Contents of the report

1. Executive summary

In this executive summary, the panel presents the main considerations which led to the assessment of the quality of the Master Earth Sciences programme of Utrecht University, which has been assessed according to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, as published on 20 December 2016 (Staatscourant nr. 69458).

The objectives of the programme are relevant and sound. The panel welcomes the programme covering most of the subdomains of the Earth Sciences. The panel is positive about students being educated in the scientific, fundamental and quantitative understanding of relevant processes in the domain and regards the programme objectives to be strong and pronounced on students' research competencies. The panel appreciates the specialisation programmes as well as the profiles being offered. The specialisations allow students to go in-depth into one of the subdomains and themes within the Earth Sciences domain. The profiles give students the chance to become communication or managerial experts in this field.

The programme objectives correspond to domain-specific reference framework for the Earth Sciences programmes. The panel welcomes the efforts by the joint Earth Sciences programmes in the Netherlands to draft this framework and regards this to be the sound and up-to-date description of the domain. The panel appreciates the programme profile having been compared to other programmes in the Netherlands.

The panel approves of students being prepared for a wide range of positions on the labour market, being positions in both private sector and public sector organisations and in academia. The panel supports programme management's plans to revive the External Advisory Board.

The panel welcomes the programme intended learning outcomes having been aligned with important European frameworks for Earth Sciences programmes, as this testifies to the international status of the programme. The intended learning outcomes correspond to the programme objectives, are complete and conform to the master level.

The admission requirements and admission procedures are up to standard. The panel appreciates the more intensive guidance for international students in the beginning of the programme.

The curriculum meets the intended learning outcomes of the programme for each of the specialisation programmes. The courses are up to standard. The panel welcomes students being introduced to the subdomains and themes of the specialisations and the study paths. The panel especially is very positive about the research components of the curriculum and the research projects students are allowed to do. Students are trained in academic skills appropriately and are offered career services. The panel is positive about the two research projects and the internship options in the curriculum. The curriculum is up-to-date. The panel considers the curriculum to be well-structured and coherent.

The panel regards the lecturers in the programme to be very skilled and to be very motivated to teach in the programme. Lecturers are clearly involved in research in the programme domain. The panel welcomes

the very substantial proportions of lecturers being BKO- or SKO-certified, testifying to their educational capabilities. The panel notes the lecturers' workload to be challenging but to be appropriately managed.

The educational concept and study methods are very adequate. The panel especially greets the system of continuous assessment. The panel suggests avoiding to further extend this system to prevent increasing too much the staff workload. The number of hours of face-to-face education is favourable. Students experience small-scale education in tutorials, practical classes and during fieldwork. The panel is positive about the organisation of study guidance in the programme, students being guided by staff members, senior students and having access to the programme study advisor. The student success rates of the programme are satisfactory.

The programme examination and assessment policies meet Faculty policies. The programme assessment system is very solid. The panel regards the Board of Examiners to be in control of the examinations and assessments of the programme. The measures taken by the programme to ensure validity and transparency of examinations and the reliability of assessments are very much up to standard.

The examination methods adopted in the programme are adequate and consistent with the goals and contents of the courses. The panel is positive about the various examinations scheduled in the courses.

Students are offered appropriate supervision in the Master Thesis projects. The assessment processes are adequate, involving two examiners and being conducted using elaborate rubrics scoring forms.

The Master Thesis projects are regarded by the panel to be very much up to standard. The theses the panel studied definitely match the intended learning outcomes of the programme. The panel supports the grades given by the programme examiners. The panel regards the Master Thesis projects to be of high quality and level. The panel greets the relatively high proportion of Master Thesis projects, leading to journal articles in international journals.

Not affecting the appreciation by the panel of the high level of programme graduates, the panel feels rules to award *cum laude* could be changed to lower the percentage of awardees.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to find appropriate positions in the programme domain. The panel is very positive about the high proportion of programme graduates proceeding to positions as PhD students.

The panel which conducted the assessment of the Master Earth Sciences programme of Utrecht University assesses this programme to meet the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, judging the programme to be good. Therefore, the panel advises NVAO to accredit the programme.

Rotterdam, 25 March 2019

Prof. dr. ir. A. Veldkamp
(panel chair)

drs. W. Vercouteren
(panel secretary)

2. Assessment process

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The panel composition was as follows:

- Prof. dr. ir. A. Veldkamp, dean ITC Faculty of Geo-Information and Earth Observation, University of Twente, the Netherlands (panel chair);
- Drs. T.M. van Daalen, director Geological Survey of the Netherlands, Netherlands Organisation for Applied Scientific Research, the Netherlands (panel member);
- Prof. dr. P.A. van der Beek, full professor, Institut des Sciences de la Terre, Université Grenoble Alpes, France (panel member);
- Prof. dr. ir. N.E.C. Verhoest, associate professor, Department of Environment, Ghent University, Belgium (panel member);
- I.S. van Essen, student Bachelor Earth Sciences, Minor Solid Earth, VU Amsterdam, the Netherlands (student member).

On behalf of Certiked, drs. W. Vercouteren served as the process coordinator and secretary in the assessment process.

All panel members and the secretary confirmed in writing being impartial with regard to the programme to be assessed and observing the rules of confidentiality. Having obtained the authorisation by the University, Certiked requested the approval of NVAO of the proposed panel to conduct the assessment. NVAO has given its approval.

To prepare the assessment process, the process coordinator convened with management of the programme to discuss the outline of the self-assessment report, the subjects to be addressed in this report and the site visit schedule. In addition, the planning of the activities in preparation of the site visit were discussed. In the course of the process preparing for the site visit, programme management and the Certiked process coordinator regularly had contact to fine-tune the process. The activities prior to the site visit have been performed as planned. Programme management approved of the site visit schedule.

Well in advance of the site visit date, programme management sent the list of final projects of graduates of the programme of the last two years. Acting on behalf of the assessment panel, the process coordinator selected the theses of fifteen graduates from the last few years. The grade distribution in the selection was ensured to conform to the grade distribution in the list, sent by programme management.

The panel chair and the panel members were sent the self-assessment report of the programme, including appendices. In the self-assessment report, the student chapter was included. In addition, the expert panel members were forwarded a number of theses of the programme graduates, these theses being part of the selection made by the process coordinator.

Well before the site visit date, the assessment panel chair and the process coordinator met to discuss the self-assessment report provided by programme management, the procedures regarding the assessment process and the site visit schedule. In this meeting, the profile of panel chairs of NVAO was discussed as well. The panel chair was informed about the competencies, listed in the profile. Documents pertaining to a number of these competencies were presented to the panel chair. The meeting between the panel chair and the process coordinator served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs.

Prior to the date of the site visit, all panel members sent in their preliminary findings, based on the self-assessment report and the final projects studied, and a number of questions to be put to the programme representatives on the day of the site visit. The panel secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions with the programme representatives during the site visit.

Shortly before the site visit date, the complete panel met to go over the preliminary findings concerning the quality of the programme. During this meeting, the preliminary findings of the panel members, including those about the theses were discussed. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were discussed as well.

On 22 January 2019, the panel conducted the site visit on the Utrecht University campus. The site visit schedule was as planned. In a number of separate sessions, the panel was given the opportunity to meet with Faculty Board representatives, programme management, Board of Examiners members, lecturers and final projects examiners, and students and alumni.

In a closed session at the end of the site visit, the panel considered every one of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented a broad outline of the considerations and conclusions to programme representatives.

Clearly separated from the process of the programme assessment, assessment panel members and programme representatives met to conduct the development dialogue, with the objective to discuss future developments of the programme.

The assessment draft report was finalised by the secretary, having taken into account the findings and considerations of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited the final report. This report was presented to programme management to be corrected for factual inaccuracies. Programme management were given two weeks to respond. Having been corrected for these factual inaccuracies, the Certiked bureau sent the report to the Board of Utrecht University, to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO:	M Earth Sciences
Orientation, level programme:	Academic Master
Grade:	MSc
Number of credits:	120 EC
Specialisations:	Earth Structure and Dynamics Earth, Life and Climate Earth Surface and Water Marine Sciences Water Science and Management
Location:	Utrecht
Mode of study:	Full-time (language of instruction English)
Registration in CROHO:	21PD-66986
Name of institution:	Utrecht University
Status of institution:	Government-funded University
Institution's quality assurance:	Approved

4. Findings, considerations and assessments per standard

4.1 Standard 1: Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings
The Master Earth Sciences programme is one of the programmes of the Faculty of Geosciences of Utrecht University. The Dean of the Faculty is responsible for all programmes of the Faculty. The programme is part of the Graduate School of Geosciences, being chaired by the Dean of the Faculty. The organisation, delivery and quality assurance management of the programme rest with the Teaching Institute of Earth Sciences. This institute falls under the responsibility of the Department of Earth Sciences and of the Department of Physical Geography. These Departments are responsible for both research and education in the Earth Sciences and Physical Geography domains within the Faculty. Programme staff members are employed by these Departments. The Teaching Institute Board is chaired by the programme director, being responsible for this programme and for the Bachelor Earth Sciences programme. For this Master programme, he is assisted by the programme coordinator and by the specialisation programme leaders. The Master Education Council, being composed of two staff members and two students, advises programme management on programme quality assurance issues. For all programmes of the Faculty, the Faculty Board of Examiners has the authority to assure the quality of examinations and assessments. For this programme, the Chamber Earth Sciences of the Board of Examiners in particular monitors examinations' and assessments' quality.

The Master Earth Sciences programme of Utrecht University is a two year, research-based, academic master programme in the multi-disciplinary Earth Sciences domain. The programme aims to study planet Earth from an Earth System Science perspective. In the programme, the Earth Sciences subdomains Geosphere, Biosphere-hydrosphere-atmosphere, and Applied Earth Sciences are studied. Most of the aspects of these subdomains are covered in the programme. Students are educated in the scientific foundations of the domain and fundamental and quantitative understanding of relevant processes, specialising in one of the subdomains. They are trained to apply and integrate knowledge, skills and attitude to carry out academic research independently in this domain.

The programme has been benchmarked against the Earth Sciences domain-specific reference framework, which has been drafted by the joint Earth Sciences programmes in the Netherlands. The objectives of the programme conform to this framework. The programme may be distinguished within this framework and compared to other programmes in the Netherlands to be broad and to cover all subdomains.

The programme offers five distinct specialisation programmes, being Earth Sciences and Dynamics, Earth Life and Climate, Earth Surface and Water, Marine Sciences, and Water Science and Management. The Earth Sciences and Dynamics specialisations studies processes operating at the Earth's crust, mantle and deep interior, and their coupling to geological phenomena at the Earth's surface. The Earth, Life and Climate specialisation addresses climate change and interaction between biosphere and geosphere in the

past, present and future. The Earth Surface and Water specialisation is directed towards the study of land degradation, rivers and coasts, natural hazards, and the interaction between hydrosphere and geosphere. The Marine Sciences specialisation offers the holistic approach to marine systems and processes. The Water Science and Management specialisation educates students in technical and societal aspects of water management. From the academic year 2018/2019 onwards, the latter specialisation will be organised by the Teaching Institute of Sustainable Development of Utrecht University. Staff from this programme will, however, continue to be involved in the specialisation. In addition, students of this programme may opt for the education and communication profile or the management, society and economics profile. The former profile trains communication specialists in the programme domain. The latter profile educates experts in addressing societal and economic challenges in this field. About 10 % to 15 % of all students opt for this profile.

The programme prepares students for the positions in the programme domain in industry, as researchers in private organisations or public sector organisations, or to proceed to PhD trajectories. Academic skills and career preparation are part of the programme objectives. For the programme, the External Advisory Board, being composed of professional field representatives, has been put in place. The Board is, however, not very active. Programme management intends to revive the Board.

The programme objectives have been translated into the intended learning outcomes of the programme. These intended learning specify advanced knowledge in one of the specialisation programmes' fields, develop and apply ideas in research contexts, problem solving skills in one of the specialisation fields, integrate, interpolate or extrapolate academic knowledge, professional and critical attitude, understanding, modelling and simulating processes in this domain, and communication and interpersonal skills.

The intended learning outcomes of the programme have been aligned with the international Points of Reference for Degree Programmes in Earth Sciences for the master level, these having been drafted as part of the Tuning Educational Structures in Europe project. To establish the master level of intended learning outcomes, the benchmark against the Dublin descriptors for the master level has been presented.

Considerations
The panel considers the objectives of the programme to be relevant and sound. The panel welcomes the programme covering most of the subdomains of the Earth Sciences. The panel is positive about students being educated in the scientific, fundamental and quantitative understanding of relevant processes in the domain and regards the programme objectives to be strong and pronounced on students' research competencies. The panel appreciates the specialisation programmes as well as the profiles being offered. The specialisations allow students to go in-depth into one of the subdomains and themes within the Earth Sciences domain. The profiles give students the chance to become communication or managerial experts in this field.

The programme objectives correspond to domain-specific reference framework for the Earth Sciences programmes. The panel welcomes the efforts by the joint Earth Sciences programmes in the Netherlands to draft this framework and regards this to be the sound and up-to-date description of the domain. The panel appreciates the programme profile having been compared to other programmes in the Netherlands.

The panel approves of students being prepared for a wide range of positions on the labour market, being positions in both private sector and public sector organisations and in academia. The panel supports programme management's plans to revive the External Advisory Board.

The intended learning outcomes correspond to the programme objectives, are complete and conform to the master level. The panel welcomes the programme intended learning outcomes having been aligned with important European frameworks for Earth Sciences programmes, as this testifies to the international status of the programme.

Assessment of this standard
These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be satisfactory.

4.2 Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings
The influx of students in the last six years was on average about 140 incoming students per year. The majority of the students come from Utrecht University bachelor programmes. About 25 % to 30 % of the incoming students originate from abroad. Small number come from other Dutch universities or from higher vocational education institutes (hbo). The entry requirements for the programme are adequate knowledge, skills and insights in the programme domain. Students with Bachelor Earth Sciences degrees from Utrecht University are admitted. Other Students have to meet equivalent requirements. The Board of Admissions of the Graduate School of Geosciences reviews the applications. All students are to submit their letter of motivation, indicating the specialisation programme they opt for. International students are more intensively guided in the beginning of the programme.

The curriculum of the programme takes two years and carries 120 EC of study load. The programme presented tables, showing the mapping of the intended learning outcomes and the courses for each of the specialisation programmes. Within the specialisations, study paths addressing specific themes have been outlined. More than 50 courses are offered within all of the specialisations. The curriculum structure is identical for each of the specialisations. In the first year, students take eight courses (each 7.5 EC). They are required to select at least two general programme courses, one course addressing academic/scientific skills and one course pertaining to research instruction and including seminars and career development activities. Students also take at least four study-path-related courses. The study paths are recommended and are designed to foster curriculum coherence. In addition, students take maximum two courses from all of the courses available in the programme. In the second year, students either do the Internship (15 EC to 30 EC) or the Guided Research project (7.5 EC to 30 EC). In addition, they complete the Master Thesis Graduation Research project (30 EC to 45 EC). Students do two research projects, allowing them to pass through the stages of the research project twice, to gain experience in this respect and to focus on different research topics. Students may also do an internship, giving them the chance to include technical, economic or societal applications of Earth Sciences expertise in the project. About 50 % of the students do Internships, about 32 % do Guided Research projects and about 17 % do both. The Internship is mandatory for students taking the education and communication or management, society and economics profiles. Within the curriculum as part of the courses or as part of the projects, students may do experimental or analytical work, draft mathematical of numerical models or do fieldwork. New trends, such as big data, are being introduced in the curriculum. Throughout the curriculum, students are exposed to research in the programme domain. Specialisations and study paths are largely determined by the research themes within the Departments of Earth Sciences and Physical Geography. Lecturers introduce current research in the courses. Students do research projects in the second year of the curriculum. Students have to attend at least ten scientific presentations and are to present their reflections on these. Academic skills are explicit parts of the courses. These skills include scientific and independent thinking, analytical skills, problem solving skills, technical skills, scientific writing skills and oral presentation skills. Students are offered workshops and training sessions to prepare them for their careers.

The teaching capacity for the Bachelor and the Master Earth Sciences programmes is about 30 FTE. About 85 permanent staff members are involved in both programmes together. In addition, postdoctoral researchers, PhD students and teaching assistants assist in courses, during fieldwork and in practical classes. Lecturers are active researchers in their fields. They are members of the research institutes Earth Sciences or Physical Geography of the Faculty of Geosciences. Nearly all lecturers have PhD degrees. Of the total number of lecturers about 87 % are BKO-certified. The others are in the process of acquiring the certificate. About 46 % of the lecturers are SKO-certified. Lecturers experience the workload as challenging. More staff has been recruited. Lecturers discuss the programme both in formal meetings and informally. Students indicate to be very content about lecturers' performances and accessibility.

The educational concept of the programme is to stimulate students to engage in active and self-directed learning processes and to actively participate in classes. To that end, activating study methods and continuous assessment are adopted. Continuous assessment means frequent assessments during courses to foster student learning processes. Study methods in the programme are lectures, tutorials, practical classes, and fieldwork. The programme is in the process of introducing blended learning. The students-to-staff ratio of the programme is about 31/1. In tutorials and practical classes and during fieldwork, the number of students is about 10 to 15 students per lecturer and/or teaching assistant. The number of hours of face-to-face education in the courses is about 16 hours per week, half of these being lectures and the other half being tutorials or practical classes. The total study load comes close to 40 hours per week. The main point of contact for students is the programme leader of the specialisation programme. Study guidance is organised in groups of students of 10 to 15 students with similar interests. These groups are guided by a senior student. The programme study advisor assists students in planning their studies, tailoring their curriculum to their career intentions and advising them in case of study problems. The student success rates are on average 38 % after two years and 65 % after three years.

Considerations
The admission requirements and admission procedures are up to standard. The panel appreciates the more intensive guidance for international students in the beginning of the programme.

The panel ascertained the curriculum to meet the intended learning outcomes of the programme for each of the specialisation programmes. The courses are up to standard. The panel welcomes students being introduced to the subdomains and themes of the specialisations and the study paths. The panel especially is very positive about the research components of the curriculum and the research projects students are allowed to do. Students are trained in academic skills appropriately and are offered career services. The panel is positive about the two research projects and internship options in the curriculum. The curriculum is up-to-date. The panel considers the curriculum to be well-structured and coherent.

The panel regards the lecturers in the programme to be very skilled and to be very motivated to teach in the programme. Lecturers are clearly involved in research in the programme domain. The panel welcomes the very substantial proportions of lecturers being BKO- or SKO-certified, testifying to their educational capabilities. The panel notes the lecturers' workload to be challenging but to be appropriately managed.

The panel regards the educational concept and study methods to be very adequate. The panel especially greets the system of continuous assessment. The panel suggests avoiding to extend this system to prevent increasing too much the staff workload. The number of hours of face-to-face education is favourable. Students experience in tutorials, practical classes and during fieldwork rather small-scale education. The panel is positive about the organisation of study guidance in the programme, students being guided by staff members, senior students and having access to the programme study advisors. The student success rates of the programme are satisfactory.

Assessment of this standard
These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be good.

4.3 Standard 3: Student assessment

The programme has an adequate system of student assessment in place.

Findings
The examination and assessment procedures in the programme as well as the responsibilities of the Board of Examiners are governed by the Faculty of Geosciences Assessment Policy.

As has been indicated, the Board of Examiners has the authority to assure the quality of examination and assessment processes of the programme. The Chamber Earth Sciences of the Board in particular monitors these processes. On behalf of the Board, the Assessment Committee reviews programme examinations and theses.

Examination methods in the programme are selected to conform to course goals. Multiple examinations are scheduled in all courses, to meet the diverse course goals and in line with the continuous assessment system of the programme. Examination methods include written examinations, written reports, papers or essays, oral presentations, practical assignments and homework assignments. At least one of the examinations is to be scheduled halfway through each of the courses. All examinations within courses have to be assessed at least satisfactory for students to pass. In case of unsatisfactory examinations, students are allowed repair tests, under specific conditions. Repair tests are graded no more than 6.

The Guided Research project and the Master Thesis or Graduation Research project are scientific research projects, to be completed independently by students. Students are expected to draft the problem statement, select the methodology, process and analyse the data and draft the written report. Before being allowed to begin these projects, students are to submit the project proposal, including the research objectives, the research questions, the methodology, and the time schedule. The Board of Examiners is to approve of the proposal. Students are entitled to supervision by staff members, who are researchers in the field. The Master thesis projects are assessed on a rather extensive list of assessment criteria, derived from the programme intended learning outcomes. The Thesis projects are assessed by the supervisor as well as by the second examiner, also being a staff member, on the basis of rubrics scoring forms. In case of grades more than 8.5, a third examiner is invited to assess the thesis.

In the programme, measures are taken to ensure the validity, reliability and transparency of examinations and assessments. The Board of Examiners appoints the examiners, who should be BKO-certified. The assessment plan for the programme allows for clear and reliable examinations and assessment, including quality assurance measures. For each of the courses, course dossiers have been compiled to document examinations and assessments of the courses. Course examinations are based upon test matrices, are peer-reviewed and include answer models. The validity of examinations and the reliability of assessments are analysed. The Assessment Committee, acting on behalf of the Board of Examiners, reviews regularly examinations and Master Thesis projects. For the programme, policies on fraud and plagiarism are in place. Students are informed about these policies. Theses and other written reports are checked for plagiarism. The Board of Examiners handles cases of fraud or plagiarism and imposes sanctions.

Considerations
The panel considers the examination and assessment policies for the programme to be appropriate, these being in line with the Faculty policies. The panel considers the assessment system of the programme to be very solid. The panel regards the Board of Examiners to be in control of the programme examinations and assessments.

The panel approves of the examination methods adopted in the programme, these being consistent with the goals and contents of the courses. The panel is positive about the various examinations scheduled in the courses.

The supervision and assessment procedures of the Master Thesis projects are up to standard. Students are offered appropriate supervision. The assessment processes are up to standard, involving two examiners and being conducted using elaborate rubrics scoring forms.

The measures taken by the programme to ensure the validity and transparency of examinations and the reliability of assessments are very much up to standard. The panel appreciates the numerous procedures having been adopted to ensure the quality of the examinations and assessments. The panel notes the examiners knowing these procedures and being prepared to work accordingly. The panel welcomes the Assessment Committee inspecting examinations and theses. The fraud and plagiarism formalities are up to standard.

Assessment of this standard
The considerations have led the assessment panel to assess standard 3, Student assessment, to be good.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings
The panel studied a total of fifteen Master theses of graduates of the programme. The average grade for these projects is 7.7 for the years 2017 and 2018. About 40 % of the projects are graded with the mark 8.0 of more. About 25 % of the programme graduates graduate *cum laude* (figure for 2012 to 2018). No less than 15 % of all Master Thesis projects result in articles in international, academic, peer-reviewed journals. External supervisors of internships are generally very positive about the students' performances.

The programme conducted a survey among alumni. About 84 % of the alumni have positions in the programme field. About 74 % of them found jobs within three months after graduation and about 89 % of them found positions within one year after graduation. The programme graduates are employed at a range of private companies and public sector organisations. Over 40 % of the programme graduates proceeded to PhD trajectories, often at prestigious institutes abroad.

Considerations
The Master Thesis projects are regarded by the panel to be very much up to standard. The theses the panel studied definitely match the intended learning outcomes of the programme. The panel supports the grades given by the programme examiners. The panel regards the Master Thesis projects to be of high quality and level. The panel greets the relatively high proportion of Master Thesis projects, leading to journal articles in international journals.

Not affecting the appreciation by the panel of the high level of programme graduates, the panel feels rules to award *cum laude* could be changed to lower the percentage of awardees.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to find appropriate positions in the programme domain. The panel is very positive about the high proportion of programme graduates proceeding to positions as PhD students.

Assessment of this standard
The considerations have led the assessment panel to assess standard 4, Achieved learning outcomes, to be good.

5. Overview of assessments

Standard	Assessment
Standard 1. Intended learning outcomes	Satisfactory
Standard 2: Teaching-learning environment	Good
Standard 3: Student assessment	Good
Standard 4: Achieved learning outcomes	Good
Programme	Good

6. Recommendations

In this report, recommendations by the panel have been listed. For the sake of clarity, these have been brought together below. These panel recommendations are the following.

- To avoid extending the system of continuous assessment as it increases too much the staff workload.
- To consider changing the rules to award *cum laude*.