

Assessment report
Limited Framework Programme Assessment

Master Hydrology

VU Amsterdam

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1. Executive summary

In this executive summary, the panel presents the main considerations which led to the assessment of the quality of the Master Hydrology programme of VU Amsterdam, 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 panel considers the programme objectives to be very relevant and sound. The programme has a strong and pronounced profile and is quite unique in the Netherlands. Although rather focused and going in-depth, the programme achieves a comprehensive view on hydrology, integrating natural sciences disciplines and gamma or socio-economic disciplines. The programme offers this view on hydrology from the Earth Sciences perspective.

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

The panel is positive about students being prepared for various positions within the domain of the programme, both in academic research and in the professional field.

The programme intended learning outcomes correspond to the programme objectives, are complete and conform to the master level.

The panel regards the student inflow numbers to be adequate and welcomes programme management considerations about rising student numbers. The panel proposes to raise the intake of students coming from other universities than VU Amsterdam and coming from abroad. The admission requirements of the programme are clear and relevant. The admission procedures are adequate, applications being screened by the Admission Board. The panel appreciates self-study modules being provided and the pre-master programme being offered.

The panel ascertained the curriculum to meet the intended learning outcomes of the programme. The courses are up to standard. Although the curriculum is coherent, the panel advises to organise electives in the second year in streams to promote curriculum structure. The panel welcomes the practical laboratory and fieldwork research components of the curriculum. In addition, the panel notes students being trained in academic skills.

The panel regards the lecturers in the programme to be capable researchers and dedicated and skilled lecturers. Their educational capabilities are up to standard, as may be deduced from the proportion of BKO-certified lecturers. The panel feels the lecturers' workload to be adequately managed. The interaction among lecturers is intensive.

The panel considers the educational concept and study methods to conform to the programme characteristics. The study methods are satisfactorily varied and induce student-centred learning. The number of hours of face-to-face education are appropriate. The panel is positive about the study guidance and feedback provided for students. The panel perceives the student success rates to be very much up to standard.

The examinations and assessment rules and regulations of the programme are adequate, these being in line with VU Amsterdam and Faculty of Science policies.

The panel approves of the examination methods adopted by the programme and welcomes the variety of methods used. The methods are consistent with the goals and contents of the courses.

The supervision and assessment processes for the Master Thesis projects have been well-organised. Students are offered appropriate supervision. The assessment procedures are up to standard, involving two examiners assessing the work separately and on the basis of assessment scoring forms. The panel proposes to limit the differences in grading of Master Thesis projects among examiners.

The panel considers the measures ensuring the validity, reliability and transparency of examinations and assessments to be up to standard. The panel appreciates examiners meeting to calibrate their assessments and grades for assignments, reports and presentations.

The Master Theses the panel studied, match the intended learning outcomes and are appropriate research projects. The level and quality of the theses differ. These differences are reflected in the grades for the theses. The panel in general supports the grades given by the programme examiners, but would have graded some of the Master theses somewhat lower. The grading of one of the theses was found by the panel to be unsatisfactory. The panel suggests to provide templates for theses, to ensure theses meeting standards and to increase awareness about theses not fulfilling requirements.

The panel regards the programme graduates to have reached the intended learning outcomes and to have very good career perspectives.

The panel that conducted the assessment of the Master Hydrology programme of VU Amsterdam 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, 18 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 VU Amsterdam to organise the limited framework programme assessment process for the Master Hydrology 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 VU Amsterdam 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. M. Landrø, full professor, Department of Petroleum Technology and Applied Geophysics, Norwegian University of Science and Technology, Norway (panel member);
- Prof. dr. ir. N.E.C. Verhoest, associate professor, Department of Environment, Ghent University, Belgium (panel member);
- L. Roelofs BSc, student Master Earth Surface and Water, Faculty of Geosciences, Utrecht University, 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 most recent years. Acting on behalf of the assessment panel, the process coordinator selected the theses of 15 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 8 and 9 January 2019, the panel conducted the site visit on the VU Amsterdam 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, Examination Board 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 VU Amsterdam, to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO: M Hydrology
Orientation, level programme: Academic Master
Grade: MSc
Number of credits: 120 EC
Specialisations: None
Location: Amsterdam
Mode of study: Full-time (language of instruction English)
Registration in CROHO: 60807

Name of institution: VU Amsterdam
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 Hydrology programme is one of the in total 24 master programmes of the Faculty of Science of VU Amsterdam. The dean of the Faculty has the responsibility for all programmes of the Faculty. This Master programme is part of the Graduate School Earth, Ecology and Environmental Sciences of this Faculty. The director of the programme is responsible for the contents, quality and implementation of the programme. The programme director is assisted by the programme coordinator. The Programme Committee for the programme, being composed of two lecturers and two students, advises programme management on quality issues. The Faculty Examination Board monitors the programme adhering to the applicable Education and Examination Regulations. The sub-committee of the Examination Board for the Earth, Ecology and Environmental domain supervises the quality of examinations and assessments of the programme. The lecturers in the programme are employed either at the Faculty Department of Earth Sciences or at the Faculty Institute for Environmental Studies.

The Master Hydrology of VU Amsterdam is a two-year, research-based, focused academic master programme within the Earth Sciences domain. The programme objectives are to study hydrological processes and the effects on human society. The programme is multi-disciplinary, deriving insights from both natural sciences and gamma sciences, such as physics, meteorology, soil sciences, ecology, geology, and economics. The objectives of the programme are to educate students in the fundamentals of the processes within the hydrological system, to teach them how these processes are connected and how the processes relate to societal issues of resource use, risks and pollution. Students are educated in scientific knowledge and understanding in this domain, are taught knowledge and skills in modelling, field measurements, and data analysis to address issues in this field and are trained in academic attitude and academic skills.

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

The programme trains students to enter the labour market, preparing them for technical positions in the field of hydrological processes or for jobs of more general nature to bring in hydrological knowledge in wider contexts. Students are educated both for positions in academic research as well as for societally oriented positions in consultancies, (local) governments or NGOs. In recent years, the Work Field Advisory Board was installed. This Board consists of professional field representatives and consults the programme on the alignment with professional field requirements.

The programme objectives have been translated into intended learning outcomes, specifying an integrated view on components of the hydrological system, their relations and the impact on society, fundamental theoretical and practical knowledge of hydrological systems and hydrological processes, knowledge and skills to carry out research independently, being able to perform at academic level, historical, philosophical and socio-economic understanding of this domain and being prepared to continue to complete a PhD thesis or to enter the international labour market.

Programme management presented the comparison of the intended learning outcomes to the Dublin descriptors for the master level.

Considerations

The panel considers the programme objectives to be very relevant and sound. The programme has a strong and pronounced profile and is quite unique in the Netherlands. Although rather focused and going in-depth, the programme achieves a comprehensive view on hydrology, integrating natural sciences disciplines and gamma or socio-economic disciplines. The programme offers this view on hydrology from the Earth Sciences perspective.

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

The panel is positive about students being prepared for various positions within the domain of the programme, both in academic research and in the professional field.

The programme intended learning outcomes correspond to the programme objectives, are complete and conform to the master level.

Assessment of this standard

These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be good.

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 number of incoming students in the last seven years fluctuated to some extent, stabilising the last three years at about 25 to 30 students. The inflow of 30 to 35 students is the optimum, given current staff and material facilities capacities. The programme expects the influx to rise gradually the coming years. When numbers of incoming would rise, adjustments in the programme will have to be made. About 45 % of the incoming students completed the Bachelor Earth Sciences and Economics programme of VU Amsterdam, while another 25 % completed the Bachelor Earth Sciences programme of VU Amsterdam. Other students have bachelor degrees from other Dutch universities or from institutes of higher vocational education (hbo) or come from abroad. The admission requirements are academic bachelor degrees with adequate knowledge of mathematics, physics, chemistry and earth sciences. Students having completed the VU Amsterdam Bachelor Earth Sciences programme are admitted unconditionally. Students with Bachelor Earth Sciences and Economics of VU Amsterdam have to have taken two quantitative courses in their last year. Students having deficiencies in one of the disciplines mentioned are to take self-study modules, prior to enrolling. Students with more deficiencies have to take the 30 EC pre-master programme. Students with hbo-degrees in Civil Engineering or Water Management are not obliged to take the pre-master programme, but should complete a self-study module. The Admission Board checks applications.

The curriculum of the programme takes two years and carries 120 EC of study load. For the programme, a table demonstrating the relations between the programme intended learning outcomes and the courses in the curriculum was presented. In the first year of the curriculum, all courses are compulsory (total of 60 EC). The second year is composed of four elective courses (24 EC) and the Master Thesis project (36 EC). The first-year courses introduce students to the components of and the processes within the hydrological system and acquaint them with the effects of the processes in the hydrological system on society. In addition, students are introduced to modelling methods and techniques and are taught measuring techniques. At the end of the first year, they apply their knowledge and skills in fieldwork. In the fieldwork course, students collect, interpret, and analyse data. In the second year of the curriculum, students take four electives in line with their preferences. Some of these electives are specific for this programme. Students may take other courses, for which they may need Examination Board approval, to ensure the curriculum is meeting the intended learning outcomes. The Master Thesis project is an individual research project. Excursions are part of the curriculum. New trends are incorporated in the curriculum.

A total number of 12 permanent staff members are involved in the programme. These lecturers are employed at the Department of Earth Sciences or at the Institute for Environmental Studies. All of these lecturers are active researchers in their fields, ensuring research-based lectures. All staff members have PhD degrees. About 83 % of the lecturers are BKO-certified, whereas 17 % are in the process of obtaining the certificate. Staff members are assisted by temporary postdocs and PhD students, who are active in practical classes, during fieldwork and in co-supervising student projects. Lecturers experience the workload as demanding, but manageable. Lecturers' meetings are scheduled regularly to discuss the programme and current developments in the programme. In addition, lecturers meet to align courses. Students indicate to be content about lecturers' performances and accessibility.

The educational concept of the programme is student-activating learning, being meant to promote students engaging actively in the learning processes. The number of hours of face-to-face education is on average about 20.0 hours per week. Study methods adopted in the programme are, among others, lectures, practical classes, modelling exercises, and fieldwork. Practical laboratory work, computer exercises or fieldwork are part of the courses and allow students to acquire practical research knowledge and skills. To promote active participation in class and to foster academic attitude and academic skills, students are required to do oral presentations, write proposals, do hands-on exercises and give poster presentations. In addition, students perform research, completing the empirical cycle. Lecturers give students feedback on their work. Students are taught to give critical feedback themselves. Students are offered access to on line study material, exercises and quizzes to prepare for lectures. The programme coordinator meets regularly with students in groups or individually to guide them through the programme. Students may also turn to the programme study advisor or the trust person for guidance. Students with whom the panel met, expressed being content about study guidance. The curriculum is perceived by students to be rather challenging, but doable. The student success rates improved over the years. Figures for the last few years show about 50 % of the students graduating after two years and about 80 % to 90 % of them graduating within three years.

Considerations

The panel regards the student inflow numbers to be adequate and welcomes programme management considerations about rising student numbers. The panel proposes to raise the intake of students coming from other universities than VU Amsterdam and coming from abroad. The admission requirements of the programme are clear and relevant. The admission procedures are adequate, applications being screened by the Admission Board. The panel appreciates self-study modules being provided and the pre-master programme being offered.

The panel ascertained the curriculum to meet the intended learning outcomes of the programme. The courses are up to standard. Although the curriculum is coherent, the panel advises to organise electives in the second year in streams to promote curriculum structure. The panel welcomes the practical laboratory and fieldwork research components of the curriculum. In addition, the panel notes students being trained in academic skills.

The panel regards the lecturers in the programme to be capable researchers and dedicated and skilled lecturers. Their educational capabilities are up to standard, as may be deduced from the proportion of BKO-certified lecturers. The panel feels the lecturers' workload to be adequately managed. The interaction among lecturers is intensive.

The panel considers the educational concept and study methods to conform to the programme characteristics. The study methods are satisfactorily varied and induce student-centred learning. The number of hours of face-to-face education are appropriate. The panel is positive about the study guidance and feedback provided for students. The panel perceives the student success rates to be very much up to standard.

Assessment of this standard

These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be satisfactory.

4.3 Standard 3: Student assessment

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

Findings

The programme examination and assessment procedures are aligned with the VU Amsterdam policies and the Faculty of Science policies.

As has been indicated, the Examination Board for the programme has the authority to monitor the quality of examination and assessment processes and products. The sub-committee of the Board for the Earth, Ecology and Environmental domain specifically monitors the examinations and assessments quality for this programme.

The examination methods for the courses are selected in line with the courses' contents. In most of the courses, multiple examinations are scheduled. The examination methods in the programme include written examinations, assignments (with computer or modelling exercises), written reports, oral presentations or poster presentations. Poster presentations may be related to literature having been studied or fieldwork having been done.

As has been said, students do one individual research project, the Master Thesis project. The procedures for these projects conform to Faculty guidelines. Students are presented topics for their projects, but are encouraged to come up with their own topics. Prior to the start of these projects, agreements are signed, specifying the project objectives, time tables and supervision. Students are entitled to supervision by one of the programme staff members. Day-to-day supervision may be delegated to PhD students or, in case of external internships, to company supervisors. Draft versions of reports are commented on by supervisors. Master Thesis projects are assessed by the supervisor and second reader independently, using thesis assessment scoring forms. The day-to-day supervisor or company supervisor may give advice. The assessment components are academic attitude (pass/fail), project execution (30 % of grade), report, including problem statement, methodology, findings and results (60 %) and oral presentation (10 %). The second reader will only assess the report. The examiners' grades for the report are averaged. In case these assessments differ more than 1.5 points or in case one of the examiners judges the project to be unsatisfactory, a third examiner will be asked to assess and grade the thesis as well. All theses are checked for plagiarism.

Programme management and the Examination Board have taken a number of measures to promote the validity, reliability and transparency of examinations and assessments. The Examination Board appoints examiners, who should have PhD degrees and, preferably, ought to be BKO-certified. Examinations' drafts are peer-reviewed by fellow-lecturers. In course files, test matrices are required. Test examinations are presented to students. Rubrics scoring forms have been adopted to assess assignments and reports. Examiners meet to compare, align and adjust their marks for assignments, reports, poster presentations and oral presentations. For the Examination Board, the Assessment Committee reviews samples of course examinations and individual research projects. All courses are reviewed every five years. Cases of plagiarism or fraud are to be reported to the Examination Board, who will handle them.

Considerations

The panel regards the examinations and assessment rules and regulations of the programme to be adequate, these being in line with VU Amsterdam and Faculty of Science policies.

The panel approves of the examination methods adopted by the programme and welcomes the variety of methods used. The methods are consistent with the goals and contents of the courses.

The supervision and assessment processes for the Master Thesis projects have been well-organised. Students are offered appropriate supervision. The assessment procedures are up to standard, involving two examiners assessing the work separately and on the basis of assessment scoring forms. The panel proposes to limit the differences in grading of Master Thesis projects among examiners.

The panel considers the measures ensuring the validity, reliability and transparency of examinations and assessments to be up to standard. The panel appreciates examiners meeting to calibrate their assessments and grades for assignments, reports and presentations.

Assessment of this standard

The considerations have led the assessment panel to assess standard 3, Student assessment, to be satisfactory.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.
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Findings

The panel studied a total of fifteen Master Theses projects of graduates of the programme. Most of the intended learning outcomes of the programme are assessed at completion of these projects. The average grades for the Master Thesis projects in the last few years were 7.9 for the year 2016/2017 and 7.7 for the year 2017/2018.

Results from the National Alumni Survey Programme show programme graduates to find appropriate positions within on average 1.5 months after graduation. The programme conducted a survey on programme graduates' careers. The results of this survey show these graduates to find positions in a wide variety of industries. Graduates are employed in, among others, research, education, public utility services, operational work, information technology or consultancy. The recently installed Work Field Advisory Board, consisting of professional field representatives, indicated being impressed with the quality of the programme.

Considerations

The Master Theses the panel studied, match the intended learning outcomes and are appropriate research projects. The level and quality of the theses differ. These differences are reflected in the grades for the theses. The panel in general supports the grades given by the programme examiners, but would have graded some of the Master theses somewhat lower. The grading of one of the theses was found by the panel to be unsatisfactory. The panel suggests to provide templates for theses, to ensure theses meeting standards and to increase awareness about theses not fulfilling requirements.

The panel regards the programme graduates to have reached the intended learning outcomes and to have very good career perspectives.

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

6. Recommendations

In this report, a number of 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 organise electives in the second year in streams, promoting the curriculum structure.
- To raise the intake of students coming from other universities than VU Amsterdam and coming from abroad.
- To limit the differences in grading of Master Thesis projects among examiners.
- To provide extended templates for theses, to ensure theses meeting standards and to increase awareness about theses not fulfilling requirements.