



Model Teaching and Examination Regulations

MASTER's Degree Programme

B. Programme-specific section
M Hydrology

Academic year 2017-2018

Section B: Programme-specific section

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Section B: Programme-specific section

1. General provisions

Article 1.1 Definitions

In addition to the definitions as laid down in article 1 of TER part A, the following abbreviations are also used in TER part B:

- a. Excursion: an excursion is a visit to a site outside of the VU University. The student population is supervised by one or more supervisors and acts as one group. An excursion has a typical duration of several hours to a week.
- b. Field course: a course which contains a component outside the VU University environment in which students actively practice the application of theory and knowledge, critical thinking, judgement and communication in a field setting. The student population is divided in several smaller groups that work with a supervisor or independently. Field courses generally have a duration of one week or more. A field course usually includes an excursion component.

Article 1.2 Degree programme information

- a. The programme M Hydrology CROHO number 60807 is offered on a full-time basis and the language of instruction is English.
- b. The programme has a workload of 120 EC.
- c. A unit of study comprises 6 EC or a multiple thereof, with the exception of Scientific Writing in English (3 EC).

Article 1.3 Intake dates

The programme is offered starting in the first semester of the academic year only (1 September). The intake date mentioned in this paragraph ensures that a programme can be completed within the nominal study duration set for the programme.

2. Programme objectives and exit qualifications

Article 2.1 Programme objective

The MSc Hydrology Programme aims to achieve that the graduate should:

- a. Have an integrated view of the various components of the hydrological system and its relation to and impacts on the functioning of society and its economic activities.
- b. Have specific and fundamental theoretical and practical knowledge of the functioning of hydrological systems and hydrological processes over a broad spectrum of spatial and temporal scales, including climate change.
- c. Be experienced in carrying out research independently. This experience is gradually developed by confrontation with research in field courses and through interaction with active researchers and subsequently through active participation in a research project, in a manner that enables the student to consciously decide whether he/she prefers to continue his/her studies in order to obtain a PhD degree or to take up a position outside the academic world.
- d. Function in his/her discipline at an academic level, both mentally and in daily practice; the MSc Hydrology Programme stimulates the social and personal development of the student by motivating consciousness, independence, communicative behaviour and co-operation.

- e. Have insight into the broad historical, philosophical and social context of the discipline and aspects concerning the intellectual integrity and moral and ethical dimensions of scientific research and its applications.
- f. Be able to start and successfully complete a PhD project or to successfully compete in the international labour market for positions at an academic level with government or government-related institutions, private companies, or elsewhere.

Article 2.2 Exit qualifications

In all events, a graduate of the degree programme will have the following final attainment levels (in relation to Dublin descriptors):

Dublin Descriptor	Final Attainment Level
A. Knowledge and insight	
A1: The graduate has specialised theoretical and practical knowledge of the science of hydrology	<p><i>The graduate has profound knowledge of and insight in:</i></p> <ul style="list-style-type: none"> ... the hydrological cycle, with all its components (e.g. atmosphere, soil, streams, etc.), relevant physical and chemical processes and interactions; ... the interaction between the hydrological system and the socio-economic system related to the use of water resources and impacts/risks of natural hazards; ... mathematics, physics, chemistry, terminology and methodology needed to conduct modern hydrological and related socio-economic research; ... computer modelling techniques used in modern hydrological and related socio-economic research. ... the impact of global change (e.g. land use and climate change) on the hydrological system and society; ... relevant measurement techniques (related to field research, remote sensing and surveying) to solve hydrological and related socio-economic issues.
B. Application of knowledge and insight	
B1: The graduate is experienced in carrying out research	<p><i>The graduate is able to:</i></p> <ul style="list-style-type: none"> ... formulate a problem based on raw data and/or data from literature and design a scientific approach for investigating and solving the problem; ... set up and execute a scientific experiment/research by selecting and applying the appropriate techniques to collect, process and analyse data (from the field, laboratory, dataset); ... develop conceptual and numerical models suited for testing hypotheses; ... programme, validate and calibrate hydrological and risk models;
B2: The graduate is able to apply scientific knowledge to problems raised in society	<ul style="list-style-type: none"> ... think in temporal and spatial dimensions and apply hydrological knowledge to solve problems related to water in our society; ... use quantitative methods to integrate knowledge of hydrology and society in order to study their relation and be able to evaluate impacts of hydrology on society and vice versa.
C. Critical judgement	
C1: The graduate is able to independently and critically judge (own) information	<p><i>The graduate can:</i></p> <ul style="list-style-type: none"> ... understand professional literature and judge its quality and usefulness for own research; ... understand the limitations of data, models, instruments and measurement techniques and how to take these into account for critically evaluating measurements;
C2: The graduate is able to think within a multidisciplinary framework	<ul style="list-style-type: none"> ... think in a multidisciplinary way and recognise the importance of (sub)disciplines and connect different types of factual information; ... understand a subject area's limits, i.e. realise that for some issues other expertise should be brought in and there is a need for

	interdisciplinary co-operation;
C3: The graduate has an understanding of his/her personal stronger and weaker points	... understand his/her personal stronger and weaker points, affinities, development potential and preferences in relation to the discipline chosen and the related professional potential.
D. Communication	<i>The graduate is able to:</i>
D1: The graduate is able to transfer knowledge and skills related to his/her subject area to other persons and is able to adequately reply to questions and problems posed within society	... to clearly present information (on data, method, analysis, findings) both written and orally to a public of specialists; ... actively and constructively participate in discussions on hydrological issues; ... to convey scientific findings to a public of non-specialists (i.e. colleagues from different disciplines, stakeholders, general public).
E. Learning Skills	<i>The graduate is able to:</i>
E1: The graduate has developed learning skills that enable him/her to educate and develop him/herself further in a specific subject area	... get acquainted with subject areas related to hydrology and link this to his/her hydrological knowledge; ... recognize the local reality of complex hydrological issues (i.e. livelihoods, cultural and gender aspects); ... independently collect, analyze and summarize information on hydrological subjects to extend his/her current knowledge;
E2: The graduate functions in his/her discipline at an academic level, both mentally and in daily practice	... compete in the international market for positions related to hydrology in academia, government, non-government organisations, private organisations, or elsewhere.

3. Further admission requirements

Article 3.1 Admission requirements

1. Admission to the Master's programme is possible for an individual who can demonstrate that he/she has the following knowledge, understanding and skills at Bachelor's degree level, obtained at an institution of academic higher education:
 - a. knowledge of: exact sciences (mathematics, physics and chemistry) and earth sciences (BSc geology, physical geography)
 - b. understanding of: common processes in exact, earth or environmental sciences
 - c. skills: general academic skills, such as analytical and critical thinking, English language skills, scientific writing skills as demonstrated by a BSc thesis
2. The Admissions Board will investigate whether the interested person meets the admission requirements. If the interested person only partially meets the criteria above the Board may make additional demands of the student before granting admission to the Master.
3. In addition to the requirements referred to in the first paragraph, the Board will also assess requests for admission in terms of the following criteria:
 - a. talent and motivation;
 - b. proficiency in methods and techniques; i.e. field or laboratory experience
 - c. willingness to address limited deficiencies through inclusion of self-study courses in the Master's programme
4. Any individual who has obtained a Bachelor's degree in academic higher education on one of the degree programmes meets the requirements referred to in paragraph 1:
 - a. Earth sciences / physical geography (VU University, University of Amsterdam, Utrecht University)

- b. Earth sciences / physical geography of a recognised academic institution with upper second-class honours and above, or GPA higher than 3.07.
 - c. Earth and Economy (VU University) when including at least two quantitative courses in the final, such as: Wis- en Natuurkunde (AB_450073), Inleiding in de anorganische geochemie (AB_450336), Geofysica en computermodellering (AB_1173), Methoden en technieken voor economisch onderzoek (AB_450346). Whether specific other courses (i.e. from other universities) are eligible for this criterium will be judged by the Admission Board.
 - d. Future Planet Studies BSc (UvA) with a major in earth sciences / physical geography, including at least two quantitative courses in the final year.
 - e. Civil engineering, Environmental Engineering or Environmental Science (higher vocational education – HBO) after successfully completing a self-study module on earth sciences.
 - f. Students who hold an equivalent BSc qualification, with upper second-class honours and above or GPA higher than 3.07, from an institution outside of the Netherlands may be admitted to the Master Hydrology at the *VU University Amsterdam* on the basis of a decision to that effect taken by the Admission Board of the Master. The Board will determine whether the foreign qualification is sufficiently relevant to warrant admission to the Master Hydrology. The Admission Board may make additional demands of the student before granting admission to the Master.
5. When the programme commences, the candidate must have fully completed the Bachelor's programme or pre-Master's programme allowing admission to this Master's programme.

Article 3.2 Pre-Master's programme

1. Pre-Master's programme's for the MSc Hydrology will be tailor-made for the student depending on his/her background in consultation with the MSc coordinator.

Article 3.3 Limited programme capacity

1. The VU faculty board will, if necessary, announce the maximum programme capacity by 1 May prior to the start of the academic year.
2. If the programme capacity determined by the VU faculty board is exceeded, the available places will be allocated by means of a non-weighted draw procedure among the candidates who have registered at least two months before the start of the academic year.

Article 3.4 Final deadline for registration

A candidate must submit a request to be admitted to the programme through Studielink before 1 June in the case of Dutch students, before 1 April in the case of EU students and before 1 February in the case of non-EU students. Under exceptional circumstances, the Examinations Board may consider a request submitted after this closing date.

Article 3.5 English language requirement for English-language Master's programmes

1. The proficiency requirement in English as the language of instruction can be met by the successful completion of one of the following examinations or an equivalent:
 - IELTS: 6.5
 - TOEFL paper based test: 580
 - TOEFL internet based test: 92-93
 - Cambridge Advanced English: A, B or C.
2. Exemption is granted from the examination in English referred to in the first paragraph to students who, within two years of the start of the programme:
 - met the requirements of the VU test in English language proficiency TOEFL ITP, with at least the scores specified in paragraph 1, or

- had previous education in secondary or tertiary education in an English-speaking country as listed on the VU website, or
- have an English-language 'international baccalaureate' diploma]

Article 3.6 Free curriculum

1. Subject to certain conditions, the student has the option of compiling a curriculum of his/her own choice which deviates from the curricula prescribed by the programme.
2. The concrete details of such a curriculum must be approved beforehand by the most appropriate Examinations Board.
3. The free curriculum is put together by the student from the units of study offered by Vrije Universiteit Amsterdam or another institution of higher education and must at least have the size, breadth and depth of a regular Master's programme.
4. The following conditions must at least have been met in order to be eligible for the Master's degree:
 1. at least 60 EC must be obtained from the regular curriculum, including the field courses (450126 and 1013).
 2. the level of the programme must match the objectives and exit qualifications that apply for the programme for which the student is enrolled.

4. Curriculum structure

Article 4.1 Composition of programme

1. The programme consists of the following components:
 - a. compulsory units of study
 - b. electives

Article 4.2 Compulsory units of study

Abbreviations of teaching method and examination format are defined in Article 1.1. The compulsory units of study are:

Year 1

Name of course component	Course code	Number of credits	Period	Level
AM_1164	Groundwater Processes	6	4	400
AM_1165	Integrated Modeling in Hydrology	6	3	400
AM_1166	Water Quality	6	2	400
AM_1167	Water Economics	6	4	400
AM_1168	Measuring Techniques in Hydrology	6	5	400
AM_1169	Field Course Hydrology	12	5+6	500
AM_450003	Catchment Response Analysis	6	1	400
AM_450014	Ecohydrology	6	1	400
AM_1196	Climate Hydrological Processes	6	2	400

Year 2

AM_1170	Master Thesis Hydrology	36	Ac. Jaar	600
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Article 4.3 Practical exercise

Except for those practical components incorporated in the compulsory units of study above (e.g. field courses, laboratory practicals, research project) and in relevant electives, the MSc Hydrology has no separate practical exercise.

Article 4.4 Electives

The student can take the following electives (year 2):

AM_1171	Advanced Groundwater Processes	6	4	400
AM_1054	Applied Water Science	6	2	
AM_1124	Modern Climate and Geo-ecosystems	6	1	400
AM_1192	Water Governance	6	3	400
AM_1197	Advanced Spatial Analyses	6	2	500
AM_1210	Water Risks	6	1	500
AM_450004	Climate Modelling	6	3	400
AM_450132	Geomicrobiology	6	Ac. Jaar	400
AM_450146	From Source to Sink	6	2	400
AM_450170	Reflection Seismic for Geologists	6	4	500
AM_450332	Global Biogeochemical Cycles	6	4	400
AM_450406	Project Environmental Impact Assessment	6	3	400
AM_450409	Geothermal Energy*	6	5	500
AM_471023	Scientific Writing in English	3	2, 5	400
AMU_0021	Biological Oceanography	6	2	500

* Course module is offered every other year.

If the student wishes to take a different course than the units of study listed, advance permission must be obtained in writing from the Examinations Board. Following elective courses outside VU University is also possible, particularly with institutes with which the program has a formal agreement, such as with the UvA under Amsterdam Water Science.

Article 4.5 Sequence of examinations

Students may participate in examinations [and/or practical exercises] for the units below only if they have passed the examination or examinations for the units mentioned:

- Field Course Hydrology (AM_1169) after passing at least two of the courses Catchment Response Analysis (AM_450003), Groundwater Processes (AM_1164), Water Quality (AM_1166), and Ecohydrology (AM_450014) before April 1 of the year in which the field course is organized.
- Master Thesis Hydrology after passing registration of at least 36 EC of the master programme concerned.

Article 4.6 Participation in practical exercise and tutorials

1. In the case of a practical training (including field work), the student must attend at least 100 % of the practical sessions. Should the student attend less than 100 %, he/she must repeat the practical training, or the Examinations Board may have one or more supplementary assignments issued.
2. In the case of tutorials with assignments, the student must attend at least 100 % of the tutorials. Should the student attend less than 100 %, he/she must repeat the study group, or the Examinations Board may have one or more supplementary assignments issued.
3. In exceptional circumstances, the Examinations Board may, at the request of the student, permit an exemption from this requirement if, in the opinion of the Board, the assessment of the intended skills is also possible with a lesser percentage of participation, with or without the imposition of supplementary requirements.

Article 4.7 Maximum exemption

- either a maximum 40 EC can be accumulated from a *completed* master programme with a duration of two years (120 EC)
- or a maximum of 20 EC can be accumulated from a *completed* master programme with a duration of one year (60 EC)

Article 4.8 Validity period for results

No further specific provisions.

Article 4.9 Degree

Students who have successfully completed their Master's final examination are awarded a Master of Science degree. The degree awarded is stated on the diploma. If it is a joint degree, this will also be stated on the diploma.

5. Transitional and final provisions

Article 5.1 Amendments and periodic review

1. Any amendment to the Teaching and Examination Regulations will be adopted by the faculty board after taking advice, and if necessary approval by the Programme Committee concerned. A copy of the advice will be sent to the authorized representative advisory body.
2. An amendment to the Teaching and Examination Regulations requires the approval of the authorized representative advisory body if it concerns components not related to the subjects of Section 7.13, paragraph 2 sub a to g and v of the WHW and the requirements for admission to the Master's programme.
3. An amendment to the Teaching and Examination Regulations can only pertain to an academic year that is already in progress if this does not demonstrably damage the interests of students.

Article 5.2 Transitional provisions

Notwithstanding the current Teaching and Examination Regulations, the following transitional provisions apply for students who started the programme under a previous set of Teaching and Examination Regulations:

1. Compulsory components

- a. No compulsory components have been replaced in 2017-2018

The compulsory component below has been replaced in 2016-2017

New component	Former component
AM_1196 Climate Hydrological Processes (6EC)	AM_450021 Unsaturated Zone Hydrological Processes (6 EC)

From 1 September 2016, students obtain the new course, unless they passed the former course.

The compulsory components below have been replaced in 2015-2016

New component	Former component
AM_1166 Water Quality (6 EC)	AM_450052 Hydrochemistry (6EC)
AM_1168 Measuring techniques in Hydrology (6 EC)	AM_450126 Field Course Netherlands (3 EC)
AM_1165 Integrated Modelling in Hydrology (6 EC)	AM_450145 Environmental Remote Sensing (6 EC)
AM_1169 Field Course Hydrology (12 EC)	AM_1013 Field Course Hydrology Portugal (15 EC)
AM_1171 Advanced Groundwater Processes (6 EC)	AM_450008 Groundwater Flow Modeling (6 EC) and/or AM_450131 Transport Processes in Groundwater
AM_1164 Groundwater Processes (6 EC)	AM_450009 Groundwater Hydraulics (6 EC)
AM_1170 Master Thesis Hydrology (36 EC)	AM_1104 Master Thesis Hydrology (27 EC)

From 1 September 2015, students obtain the new course, unless they passed the former course.

The compulsory components below have been replaced in 2012-2013

New component	Former component
AM_1104 Master Thesis Hydrology (27 EC)	AM_450122 Master Thesis Ecohydrology O Variant (27 EC) AM_450123 Master Thesis Ecohydrology Traineeship M Variant (27 EC) AM_450124 Master Thesis Hydrogeology O Variant (27 EC) AM_450125 Master Thesis Hydrogeology Traineeship M Variant (27 EC)

From 1 September 2012 students obtain the new thesis, unless they passed the former.

The compulsory components below have been replaced in 2011-2012

New component	Former component
AM_1012 Hydrological Systems and Water Management (3 EC)	AM_450057 Regional Hydrogeology and Groundwater Management (6 EC)
AM_1013 Field Course Hydrology Portugal (15 EC)	AM_450173 Field Course Hydrology Portugal (12 EC)

From 1 September 2011 students obtain the new course, unless they passed the former course.

b. For students who started their programme before academic year 2015-2016, the courses below are not compulsory:

- AM_1167 Water Economics (6 EC)

For students who started their programme before academic year 2012-2013 the courses below are not compulsory:

- AM_450008 Groundwater Flow Modeling (6 EC)
- AM_450145 Environmental Remote Sensing (6 EC)
- AM_450131 Transport Processes in Groundwater (6 EC)

Student that have already successfully completed the course(s) before 1 September 2012 can use this as (an) elective (free optional) course(s)

For students who started their programme before academic year 2011-2012 the courses below are not compulsory:

- AM_450014 Ecohydrology (6 EC)
- XX04 Hydrological Systems and Water Management (6 EC)
- Student that have already successfully completed the course(s) before 1 September 2011 can use this as (an) elective (free optional) course(s)
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- c. The final examination programme should always total at least 120 EC.

2. Electives

a. The courses below are no longer available in the programme but are still elective (free optional) components for students who started their programme before academic year 2016-2017 and have passed the courses' examinations:

Courses excluded as elective since academic year 2017-2018

- AM_1196 Climate Hydrological Processes (6 EC; now compulsory)
- AM_468023 Water management (6 EC)
- AM_450188 Climate and Policy (6 EC)

Courses ended in academic year 2015-2016

- AM_450021 Unsaturated Zone Hydrological Processes (6 EC)

Courses ended in academic year 2014-2015

- AM_450008 Groundwater Flow Modelling (6 EC)
- AM_450131 Transport Processes in Groundwater (6 EC)
- AM_1012 Hydrological Systems and Water Management (3 EC)
- AM_450148 Isotope Hydrology (3 EC)
- AM_450145 Environmental Remote Sensing (6 EC)
- AM_450204 Applied Geophysics in Hydrology(3 EC)

Courses ended in academic year 2013-2014

- AM_450137 Aquatic Ecology (6 EC)
- AM_1015 Sustainable Land Management (6 EC)
- AM_450185 Modern Climate Systems (3 EC)
- AM_450313 Modern Geo-ecosystems (3 EC)

Courses ended in academic year 2012-2013

None

Courses ended in academic year 2011-2012

- AM_450135 Thematic Research Project Ecohydrology (12 EC)
- AM_450129 Thematic Research Project Hydrogeology (12 EC)
- AM_450133 Contaminant Hydrogeology (6 EC)

Courses ended in academic year 2010-2011

- AM_450060 Soil Vegetation Atmosphere Exchange (6 EC)

b. The final examination programme should always total 120 EC.

Article 5.3 Publication

1. The faculty board will ensure the appropriate publication of these Regulations and any amendments to them.
2. The Teaching and Examination Regulations will be posted on VUnet.

Article 5.4 Effective date

These Regulations enter into force with effect from 1 September 2017.

Advice from Programme Committee, on 20 April 2017

Approved by authorized representative advisory body, on 6 July 2017

Adopted by the Faculty Board, on 21 July 2017

Appendix I

List of articles that must be included in the OER pursuant to the WHW (articles in framed boxes):

Section A

Art. 1.1	7.13, para 1, WHW
Art. 2.1	7.13, para 2 sub w
Art. 3.2	7.13, para 2 sub e
Art. 4.2	7.13, para 2 sub h and l
Art. 4.3	7.13, para 2 sub n
Art. 4.4	7.13, para 2 sub o
Art. 4.5	7.13, para 2 sub j, h
Art. 4.7	7.13, para 2 sub r
Art. 4.8	7.13, para 2 sub k
Art. 4.9	7.13, para 2 sub p
Art. 4.10	7.13, para 2 sub q
Art. 4.11	7.13, para 2 sub a
Art. 5.1	7.13, para 2 sub u
Art. 5.2	7.13, para 2 sub m

Section B

Art. 1.2	7.13, para 2 sub i
Art. 2.1	7.13, para 1 sub b, c
Art. 2.2	7.13, para 2 sub c
Art. 3.1	7.25, para 4
Art. 4.1	7.13, para 2 sub a
Art. 4.2	7.13, para 2 sub e, h, j, l
Art. 4.3	7.13, para 2 sub t
Art. 4.4	7.13, para 2 sub e, h, j, l
Art. 4.5	7.13, para 2 sub s
Art. 4.6	7.13, para 2 sub d
Art. 4.8	7.13, para 2 sub k