

# **Teaching and Examination Regulations Master's Degree Programmes**

B. programme-specific section

**M Earth Sciences**

Academic year 2015-2016

**Section B: Programme-specific section**

**Contents**

Article 1.2	Degree programme information .....	3
Article 1.3	Intake dates .....	3
2.	Programme objectives and exit qualifications .....	3
Article 2.1	Programme objective .....	3
Article 2.2	Exit qualifications .....	3
3.	Further admission requirements .....	6
Article 3.1	Admission requirements .....	6
Article 3.2	Pre-Master's programme .....	7
Article 3.3	Limited programme capacity .....	7
Article 3.4	Final deadline for registration .....	8
Article 3.5	English language requirement for English-language Master's programmes ....	8
Article 3.6	Free curriculum .....	8
4.	Curriculum structure .....	8
Article 4.1	Composition of programme .....	8
Article 4.2	Compulsory units of study .....	9
Article 4.3	Practical exercise .....	15
Article 4.4	Electives .....	15
Article 4.5	Sequence of examinations .....	16
Article 4.6	Participation in practical training and tutorials .....	17
Article 4.7	Maximum exemption .....	17
Article 4.8	Validity period for results .....	17
Article 4.9	Degree .....	17
5.	Transitional and final provisions .....	17
Article 5.1	Amendments and periodic review .....	17
Article 5.2	Transitional provisions .....	17
Article 5.3	Publication .....	20

## **Section B: Programme-specific section**

### **1. General provisions**

#### **Article 1.1 Definitions**

ESPCaR	Earth Surface Processes, Climate and Records. A specialization in the MSc Earth Sciences that results from a merger between the former specializations Applied Environmental Geosciences (AEG) and Palaeoclimate and Geo-ecosystems (PG)
ES&E	Earth Sciences and Economics – specialization in the MSc Earth Sciences
G&G	Geology and Geochemistry. A specialization in the MSc Earth Sciences, focusing on the Earth's interior, geology, and geochemistry

#### **Article 1.2 Degree programme information**

1. The programme Earth Sciences, CROHO number 66986, is offered on a full-time basis and the language of instruction is English.
2. The programme has a workload of 120 EC.
3. A unit of study generally comprises 6 EC or a multiple thereof. Selected courses comprise 3 EC or a multiple thereof.
4. In rare cases units of study comprise deviating numbers of EC due to courses being offered at other Dutch universities with their own rules for the size of units of study

#### **Article 1.3 Intake dates**

The programme is offered starting in the first semester of the academic year only (1 September). The intake date(s) mentioned in this paragraph ensure(s) 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 objective of the programme is to educate a graduate so that he or she:

1. Has specific and fundamental theoretical and practical knowledge of Earth science processes, notably within his/her field of specialization, as a basis for predicting the further course of processes, including the role of mankind now and in the future. Insight into Earth processes requires further deepening of basic knowledge, understanding of a broad spectrum of spatial and temporal scales and an approach focusing on the interaction by and between the various Earth domains.
2. Has experience in carrying out research independently. This experience is gradually developed within the programme through exposure to research and interaction with active researchers and, ultimately, through active participation in research. This occurs in such a way that it allows 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.
3. Functions in his/her discipline at an academic level, both mentally and in daily practice; the programme stimulates the social and personal development of the student by motivating societal awareness, independence, communicative behaviour and co-operation.
4. Recognizes the need to continue his/her education by following relevant developments within the field of Earth sciences to maintain a state-of-the-art knowledge basis, and is prepared to realize this.
5. Is able to start and successfully complete a PhD thesis or to successfully compete in the (inter-) national labour market for positions at an academic level with government or government-related institutions, private companies, or elsewhere.
6. Has 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.

#### **Article 2.2 Exit qualifications**

The objectives listed in the Programme Objectives (Article 2.1) have been translated into final exit qualifications of the MSc Earth Sciences programme in relation to Dublin descriptors. The exit qualification levels are listed below:

### **Dublin descriptor 1: Knowledge and insights**

*The graduate has demonstrated knowledge and insights in a field of study that builds upon their general secondary and bachelor education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study.*

#### **General**

The student has a basic understanding of the theory and scientific principles behind the theme or techniques taught, and an appreciation of when and how it can be appropriately used or applied. Depending on the track followed the graduate has:

#### **(1) Earth Surface Processes, Climate and Records (ESPCaR)**

- a substantial knowledge of climate systems that operated both in the past and at present, and the interactions of the different components of the climate system;
- knowledge of the different components (ice, atmosphere, land and oceans) of the climate regime and their properties and how they interact;
- knowledge of changes that (presently) occur at the earth surface and the interaction with climate and environmental variation at different spatial and temporal scales;
- understanding of the processes that regulate the transfer of energy, water and trace gases between the land surface and the atmosphere;
- good theoretical understanding of mathematics, physics, chemistry and statistics in relation to geo-environmental sciences.
- knowledge of the proxies employed in palaeoclimate and geo-ecosystem research.
- knowledge of hydrology and/or Geographical Information Science, Remote Sensing techniques;
- profound knowledge of the methods applied in environmental geosciences.

#### **(2) Earth Sciences and Economics (ES&E)**

- basic knowledge of basin assessment
- a profound knowledge of economic principles on spatial policy making and landscape assessment
- good theoretical understanding of Geographical Information Science, Remote Sensing and Decision Making techniques
- Depending on the focus of elective courses in this track, the graduate has profound knowledge of:
  - climate systems and their interaction to geo-ecological systems, man, policy making and spatial economics, and/or;
  - the water cycle interacting with the elements of ecosystem functioning, land use, spatial economics and policy, and/or;
  - energy systems, especially geothermal, its policy implications and spatial economics.

#### **(3) Geology and Geochemistry (G&G)**

- a regional knowledge of worldwide geological systems and their settings;
- knowledge of relationships between geological processes in Earth's interior (subduction, metamorphism, magmatism) and related surface expressions and sedimentary sequences;
- knowledge of processes of heat transport and fluid flow, and regional scale lithosphere deformation;
- knowledge of interpretation techniques of subsurface geophysical and geological data;
- knowledge of thermochronological methods and their applications.

### **Dublin descriptor 2: Applying knowledge and insight in practice**

*The graduate can apply his/her knowledge and insight in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study.*

#### **General**

The student has achieved a deep enough knowledge of themes or techniques that (s)he can demonstrate that (s)he is in a position to apply them. In essence it means that this particular theme or group of themes will lie in the student's specialist direction.

The graduate is able to:

- formulate a problem based on raw data and/or data from a literature study and design a sound, scientific, approach for researching and solving the problem;
- formulate a research proposal, which includes the problem formulation, the hypotheses, the proposed execution and the finalization of the project;
- develop (conceptual) models suited for the testing of hypotheses and to give explanations;
- collect and critically compile the literature significant to a specific topic to be studied;
- operate within a multidisciplinary framework and to connect different types of factual information.

(1) Earth Surface Processes, Climate and Records (ESPCaR)

- unravel a sedimentary archive embedding climate and palaeo-environmental signals, by employing an array of techniques;
- contact affiliated departments to perform certain techniques, not available in our Institute.
- translate and quantify ongoing processes at the land surface that generate climate change into changing boundary conditions for climate modelling;
- discern the various physical and biogeochemical processes that contribute to (future) climate change and their impact on mans sustainability;
- use his/hers knowledge and insights in the political debate on the role that future climate developments play.
- perform environmental analyses and reconstructions.

(2) Earth Sciences and Economics (ES&E)

- apply and understand economic evaluation tools for policy assessment, e.g. CBA and MCA;
- apply GIS, RS and decision making techniques on relevant Earth-Sciences-and-Economical problems, and understand the interactions at the disciplinary interfaces;
- bridge the gap between industry, academia, government agencies and NGO's in dealing with resource and water management, risk assessment, land use and ecosystem services;
- understand the positions in the political debate on the management of natural resources, water and landscape.

(3) Geology and Geochemistry (G&G)

- apply fieldwork skills, i.e. linking theoretical knowledge and factual information to field observations;
- apply analogue and/or numerical modelling techniques associated with the subject of specialization.

**Dublin descriptor 3: Critical judgement**

*The graduate has the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues.*

The graduate:

- understands professional literature and can judge its quality and usefulness for own research;
- is able to determine independently which data or methods are required to obtain a specific result (or to finish a project);
- has an understanding of the subject area's limits, i.e. realize that at a certain stage other expertise should be brought in, or that there is a need for interdisciplinary co-operation;
- has an understanding of his/her personal stronger and weaker points, affinities, development potential and preferences in relation to the discipline chosen and the related professional potential;
- is able 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;
- is able to recognize and to judge ethical aspects of science and of the application of science.

#### **Dublin descriptor 4: Communication**

*The graduate can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.*

The graduate is able:

- to complete a report on trainee work, subject matter studied, or research carried out, that meets the requirements of an international scientific journal;
- to clearly present information, both written and orally to a public of specialists from the same subject area, on a topic that was independently studied (in English);
- to read publications and reports in his/her native language and in English;
- to contribute in international scientific forums;
- to actively and constructively participate in discussions and meetings;
- to operate individually as well as to co-operate in small international and multidisciplinary working groups at a level that is at the frontier of the subject area of study;
- to apply her/his knowledge in such a way that it demonstrates a professional attitude towards her/his work or profession.

#### **Dublin descriptor 5: Learning skills**

*The graduate has developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy*

The graduate has developed skills:

- to independently collect and to critically compile the literature significant to a specific topic to be studied;
- to use modern techniques to maintain his knowledge up-to-date;
- to read and understand the specialization's specific journals, as well as the more general natural sciences journals such as Nature and Science;
- to recognize the need to continue his/her education (the graduate is aware of the need to keep in touch with relevant developments within his/her discipline, and is prepared to realize this);
- to be able to get acquainted with one of the other specializations within the subject area in the course of a few months;
- to be able to get acquainted within a reasonable time with a subject area within the discipline which is different from the one of the degree programme.

### **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 the Bachelor's degree level, obtained at an institution of academic higher education:
  - a. knowledge: natural sciences (mathematics, physics, and chemistry) and earth sciences (BSc level geology/geochemistry/geophysics)
  - b. understanding: common processes in earth sciences
  - c. skills: general academic skills including analytical and critical thinking; English language skills; scientific writing skills as demonstrated by a BSc thesis or equivalent
2. The Admissions Board will investigate whether the interested person meets the admission requirements.
3. In addition to the requirements referred to above, the Board may also assess requests for admission in terms of the following criteria:
  - a. talent and motivation;
  - b. proficiency in relevant methods and techniques
4. Students with a Bachelor of Science degree in Earth Sciences (Aardwetenschappen) from VU University Amsterdam will receive direct admission to the Master Earth Sciences.
5. The following additional admission requirements for students with a Bachelor of Science degree in Earth Sciences (Aardwetenschappen) from VU University Amsterdam apply to specific specializations within the Master Earth Sciences:
  - a. Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (specialization/afstudeerrichting Solid Earth/Vaste Aarde) will be

- admitted to the specializations ESPCaR, SE, Science Communication (C variant) and Education (E variant)
- b. Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (specialization/afstudeerrichting Earth Surface/Aardoppervlak) will be admitted to the specializations ESPCaR, Science communication (C variant), Education (E variant).
  - c. Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie') will be admitted to the specialization ES&E
  - d. Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie'), including the minor Earth Surface (Aardoppervlak) will be admitted to the specialization ESPCaR
  - e. Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie'), including the component 'Sociale geografie I' (AB\_450099), will be admitted to the specialization Education (E-variant)
  - f. Students who do not receive direct admission to a given specialization within the Master Earth Sciences based on their Bachelor's degree variant can still be admitted to the Master's programme in question on the grounds of a decision to that effect taken by the Admission Board of the Master. In taking this decision, the Admission Board will specify the specialization within the Master Earth Sciences to which the student in question is admitted. The Admission Board may make additional demands of the student before granting admission to the Master.
6. Students who hold a Bachelor's degree in Earth Sciences from a Dutch university other than the VU University Amsterdam may be admitted to the Master Earth Sciences at VU University Amsterdam on the basis of a decision to that effect taken by the Admission Board of the Master. In taking this decision, the Admission Board will specify the specialization within the Master Earth Sciences to which the student in question is admitted. The Admission Board may make additional demands of the student before granting admission to the Master.
  7. Students who hold a Bachelor's degree in a science or technical subject from a Dutch university may be admitted to the Master Earth Sciences at VU University Amsterdam on the basis of a decision to that effect taken by the Admission Board of the Master. The Admission Board will determine whether the Bachelor's programme completed by the candidate is sufficiently relevant to warrant admission to the Master Earth Sciences and will specify the specialization within the Master in Earth Sciences to which the candidate is admitted. The Admission Board may make additional demands of the student before granting admission to the Master's programme.
  8. Students who hold a certificate obtained from a university of applied sciences (HBO diploma) in the Netherlands may be admitted to the Master Earth Sciences at VU University Amsterdam on the basis of a decision to that effect taken by the Admission Board of the Master. The Admission Board will determine whether the programme of higher vocational education completed by the candidate is sufficiently relevant to warrant admission to the Master Earth Sciences and will specify the specialization within the Master Earth Sciences to which the candidate is admitted. The Admission Board may make additional demands of the student before granting admission to the Master's programme.
  9. Students who hold an equivalent qualification from an institution outside of the Netherlands may be admitted to the Master Earth Sciences at VU University Amsterdam on the basis of a decision to that effect taken by the Admission Board of the Master. In taking this decision, the Admission Board will specify the specialization within the Master Earth Sciences to which the student in question is admitted. The Admission Board may make additional demands of the student before granting admission to the Master's programme.
  10. 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

The MSc Earth Sciences has no predefined pre-master programme

### Article 3.3 Limited programme capacity

1. The 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 faculty board is exceeded, the

available places will be allocated by means of an unweighted 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 the dates that are determined in the Application and Registration Regulation (at <http://www.vu.nl/en/programmes/practical/policies/index.asp>). 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. International applicants are required to pass an English language proficiency test. 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 before 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 VU University Amsterdam 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,
  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:
  - compulsory units of study
  - electives
2. The programme offers five specializations:
  - I. Research specializations
    - a) Earth Surface Processes, Climate and Records (ESPCaR)
    - b) Earth Sciences and Economics (ES&E)
    - c) Geology and Geochemistry (G&G)
  - II. Education specialization (E variant)
  - III. Science communication specialization (C variant)The compulsory parts of these specializations are listed in Article 4.2. The electives of these specializations are listed in Article 4.4.



**Article 4.2 Compulsory units of study**

Note: \* in the Tables below denotes that the information can be found in the Study Guide

**I. Research specializations****1. Earth Surface Processes, Climate and Records (ESPCaR), with 93 EC in compulsory courses**

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Modern Climate and Geo-ecosystems	AM_1124	6	1	Lectures / workshops	Written exam	400
Sedimentary Environments and Climate Archives	AM_450330	6	1	Lectures / workshops	Written exam/report	400
From Source to Sink	AM_450146	6	2	Lectures	Written exam, essay, practicals	400
High Resolution Archives	AM_450331	6	2	Lectures/ practicals	Essay/practical	400
Global Biogeochemical Cycles	AM_450332	6	4	Lectures	Written exam	400
Practical: Palaeoclimate Change and Environmental Impacts	AM_1144	6	4	Lectures/ practicals	Written exam / paper	400
Basics in GIS	AM_450226	3	5	Lectures/ practicals	Written exam, practicals	400
Scotland Excursion**	AM_450354	3	6	Field course	Presentation	400
Research Project ESPCaR	AM_1149	27	1,2,5,6	research	Written report, presentation	400
Master Thesis Earth Surface Processes, Climate and Records	AM_1147	24***	4,5,6	research	Written report/ presentation	500

\*\* Taught every other year, next excursion in 2015-2016

\*\*\* Extension is possible by at most 12 EC and only with the (prior) permission of the Examination Board

In addition, this specialization has the following restricted options (6 EC required):

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Climate Modelling	AM_450004	6	3	Lectures	Written exam	400
Environmental Remote Sensing	AM_450145	6	3	Lectures / workshops	Written exam	400

**2. Earth Sciences and Economics (ES&E), with 84 EC in compulsory courses**

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Microeconomic Foundation for Spatial Policy	AM_450400	6	1	Lectures/ workshops	Written exam/ assignment	400
Empirical Methods for Spatial Policy	AM_450401	6	2	Lectures	Written exam/ assignment	400
Decision Making Processes	AM_450402	6	2	Lectures / practicals	Written exam & individual assignment	400
Exploring Earth	AM_450405	6	4	Lectures/	Written	400

Processes and Resources				tutorials	exam/paper/presentation	
Imaging and Assessing Landscapes	AM_1183	6	4	*	*	400
Project Environmental Impact Assessment	AM_450406	6	3	Project, excursion, tutorials, practicals	writing a tender / process management / report / presentation	
Water and Policy	AM_468023	6	1	Lectures	Written exam & essay	400
Research Project Earth Sciences and Economics	AM_1103	18	1,2,5,6	Research	Written report, presentation	500
Master Thesis Earth Sciences and Economics	AM_1150	24	3-6	Research	Written report/ Presentation	500

In addition, this specialization has the following restricted options:

i) Students have to select one of the following courses

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Geothermal Energy	AM_450409	6	5	Lectures/practicals	Practicals / case studies evaluations	400
Economics of Climate Change	E_STR_EC C	6	4	Lectures	Written exam	400

ii) Students should select at least 6 EC of the following Earth Science oriented course components, and at least 6 EC of the following Economics oriented course components:

Earth Science oriented

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Ecohydrology	AM_450014	6	1	Lectures/workshops	Written exam/presentation	400
Geothermal Energy	AM_450409	6	5	Lectures/practicals	Practicals / case studies evaluations	400
Modern Climate and Geo-ecosystems	AM_1124	6	1	Lectures / workshops	Written exam	400
Petroleum Systems	AM_450408	6	1	Lectures/practicals	Written exam	400

## Economics oriented

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Environmental Economics	E_STR_EEC	6	2	Lectures/ assignments / practicals	Written exam / presentation / two assignments / participation	400
Economics of Climate Change	E_STR_ECC	6	4	Lectures	Written exam	400
Regional and Urban Economics	E_STR_RUE	6	2	Lectures/ tutorials	Written exam/ assignment	400
Transport Economics	E_STR_TREC	6	4	Lectures	Written exam/ assignment	400

iii) Students should select another 18 EC from the courses listed under both ii) above and the following list:

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Building Bridges between Science and Society (UvA)	AMU_0010	6	5	Lectures, tutorials, peer teaching and class discussion	Presentation / individual Exam	400
Climate and Policy	AM_450188	6	3	Lectures/ group discussions	Written exam/ paper	400
Ecosystem Management (UvA)***	AMU_0011	6	**	**	**	**
Energy Systems Transitions	AM_468019	6	3	Lectures / workshops	Written exam / paper	400
Field Course Geo-Ecological Systems (UvA)	AMU_0012	12	6	**	Field work, Presentation, Report article and datasets	**
Integrated Coastal and Dune Management (UvA)***	AMU_0013	6	6	lectures, field excursions, literature discussions , practicals	Oral presentations / attitude during discussions and excursions / assignment	400
Man and Climate	AM_450187	3	4	Lectures/ tutorials	Written exam	500
Reflection Seismics	AM_450170	6	4	Lectures/ practicals	Written exam & practicals	400
Sedimentary Environments and Climate Archives	AM_450330	6	1	Lectures / workshops	Written exam/report	400
Soil and Landscape Degradation (UvA)	AMU_0014	6	3	Discussion lectures, seminars, self-study, and projects	Discussion lectures / exam / three presentations / report	400

Spatial Ecology and Global Change	AM_470502	6	1	tutorials	Written exam/ presentation/ practical	400
System Innovation and Transition Management (UvA)	AMU_0015	6	4	lectures / work groups	written essay / written exam	400
Sustainable Energy Analysis	AM_468018	6	1	Lecture/ team assignment / workshop	Written exam/ presentation	400

\*\*see studiegids.uva.nl

\*\*\* offered once every two years: AMU\_0013 in 2014-2015 (not in 2015-2016); AMU\_0011 in 2015-2016 (not in 2014-2015)

### 3. Geology and Geochemistry (G&G), with 81 EC in compulsory courses

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Introduction Field Excursion**	AM_450229	3	1	Field course	Field performance / presentation/ written exam	*
Mantle Properties	AM_450225	3	1	Lectures/ practicals	Written exam/ presentation/ abstract/ exercises	*
Petroleum Systems and Regional Geology	AM_450179	3	1	Lectures/ practicals	Written exam & practicals	*
From Source to Sink: Chemical and Physical Cycles	AM_450146	6	2	Lectures/ practicals	Written exam/ essay/ report/ game	*
Sedimentary Basins	AM_450154	6	2	Lectures /practicals	Written exam & practicals	*
Orogenesis	AM_450190	6	3	Lectures/ practicals	Written exam/ essay/ report/ presen- tation/ poster	*
Research Project Geology and Geochemistry	AM_1185	27	1,2,5,6	Research: Field/ lab/ work- placement	Written report, presentation	*
Master Thesis Geology and Geochemistry	AM_1186	27***	3-6	Research: Field/ lab/ work- placement	Written report/ presentation	*

\*\*Not offered in 2014-2015, will be offered in 2015-2016

\*\*\* Extension is possible by at most 12 EC and only with the (prior) permission of the Examination Board

**II. Education**

## i) Earth Sciences content (60 EC)

*Specialisation ESPCaR or G&G*

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Research Project from one of the specialisations	AM_1149 or AM_450200	27	1,2,5,6	research	Written report	
Sociale Geografie II	AM_1051	12		tutorials	*	400
Compulsory Course from same specialization as chosen research project		12		*	*	*
Earth Science electives (Article 4.4)		9		*	*	*

*Specialisation ES&E*

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Research Project Earth Sciences and Economics	AM_1103	18	1,2,5,6	Research	Written report	500
Sociale Geografie II	AM_1051	12		tutorials	*	400
Compulsory Courses from specialization ES&E		21		*	*	*
Earth Science electives (Article 4.4)		9		*	*	*

## ii) Educational content (60 EC).

Compulsory units of the specialization

\* Please consult the study guide for information about Teaching methods and Type of test

Name of course component	Course code	Number of credits	Period or semester	Teaching method*	Type of test*	Level
Praktijk 1	O_MLPRAK_1	6	Ac. year			400
Praktijk 2	O_MLPRAK_2	9	Ac. Year			400
Praktijk 3	O_MLPRAK_3	15	Ac. Year			400
Didactiek 1	O_MLDIDAC_1	6	Ac. Year			400
Didactiek 2	O_MLDIDAC_2	6	Ac. Year			400
Didactiek 3	O_MLDIDAC_3	9	Ac. Year			400
Praktijk onderzoek 1	O_MLPROZ_1	3	Ac. Year			400
Praktijk onderzoek 2	O_MLPROZ_2	6	Ac. Year			400

If the student is exempted for parts of the specialisation in Education, the exempted EC have to be compensated with other mastercourses of the programme.

- c. 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.

**III. Science Communication**

## i) Earth Sciences content (60 EC)

*Specialisation ESPCaR or SE*

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Research Project from one of the specialisations	AM_1149 or AM_450200	27	1,2,5,6	research	Written report	
Compulsory Course from same specialization as chosen research project		12		*	*	*
Earth Science electives (Article 4.4)		21		*	*	*

*Specialisation ES&E*

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Research Project Earth Sciences and Economics	AM_1103	18	1,2,5,6	Research	Written report	500
Compulsory Courses from specialization ES&E		21		*	*	*
Earth Science electives (Article 4.4)		21		*	*	*

## ii) Science Communication content compulsory courses (42 EC)

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Science and Communication	AM_470587	6	1	Lectures/ workgroups	Written exam/ assignments	500
Qualitative and Quantitative Research Methods	AM_470582	6	1	Lectures/ workgroups	Written exam/ assignments	400
Research Internship Science Communication <i>or</i> Reflective Practice Internship Science Communication	AM_1162 <i>or</i> AM_1163	30	Ac. year	*	*	600

## iii) Science communication content restricted elective courses (choose 18 EC)

Name of course component	Course code	Number of credits	Period	Teaching method	Type of test	Level
Communication, Organisation and Management	AM_470572	6	2	Lectures/ workshop	Written exam/ report	500

Science Museology	AM_470590	6	3	Lectures/ workshop	Written exam/ assignment/ presentations	500
Science in Dialogue	AM_1002	6	2	Lectures/ workgroups	Written exam/ portfolio/ assignment	500
Science Journalism	AM_471014	6	2	Lectures/ seminars	Written exam/ assignments	500

#### Article 4.3 Practical exercise

Except for those practical components incorporated in the compulsory units of study above and in relevant electives, the MSc Earth Sciences programme has no separate practical exercise.

#### Article 4.4 Electives

Name of course component	Course code	Number of Credits	Period or semester	Teaching method	Type of test	Level
3D Seismic Interpretation and Production Geology	AM_450316	6	1	Lectures/ practicals	Written exam/ practicals/ presentation	*
Advanced Geochronology	AM_450171	3	5	*	*	*
Advanced Inorganic Geochemistry	AM_450172	3	5	Lectures/ groupwork	Various *	
Advanced tectonics	AM_1173	6	5	*	*	*
Basics in Geographical Information Systems	AM_450226	3	5	Lectures/ practicals	Written exam, practicals	400
Capita Selecta Geology and Geochemistry	AM_1174	6	4	*	*	*
Catchment Response Analysis	AM_450003	6	1	Lectures / workshops	Written exam / model ling exercise	400
Climate Modelling	AM_450004	6	3	lectures	Written exam	400
Climate and Policy	AM_450188	6	3	Lectures/ group discussions	Written exam/ paper	400
Causes and Consequences of Environmental Change	AM_1049	6	1	Lectures/ workgroups	Written exam/ group activities/ assignments	400
Diagenesis of Sedimentary Rocks	AM_450169	3	5	Lectures/ Practicals	Written exam/ report	*
Ecohydrology	AM_450014	6	1	Lectures/ workshops	Written exam/ presentation	400
Environmental Remote Sensing	AM_450145	6	3	Lectures / workshops	Written exam	400
Geothermal Energy*	AM_450409	6	5	Lectures/ Practicals	Practicals / case studies evaluations	400
Global Biogeochemical Cycles	AM_450332	6	4	Lectures	Written exam	400
Groundwater Processes	AM_1164	6	2	Lectures/workshops	Written exam	400
Groundwater Microbiology and Geochemistry (Geomicrobiology)	AM_450132	6	1	Self-study	Essay, oral evaluation	*

Man and Climate	AM_450187	3	4	Lectures/ tutorials	Written exam	500
Magmatic Processes	AM_450189	6	4	Lectures/ group work	Written exam/ paper/ presentation/ exercises	*
Metamorphism and P-T Evolution	AM_450176	6	4	Lectures/ classwork	Written exam/ paper/ presentation	*
Modern Climate and Geo-ecosystems	AM_1124	6	1	Lectures / workshops	Written exam	400
Petroleum Geology of the North Sea	AM_450317	7	2	Lectures/Project	Written exam/ project work/ presentation	*
Planetary Science	AM_450273	6	1/2	Lectures/ excursion	Various *	*
Practical: Palaeoclimate change and Environmental Impacts	AM_1144	6		*	*	400
Precambrian Geology	AM_450164	3	4	Lectures	Written exam/ presentation/poster	*
Reflection Seismics	AM_450170	6	4	Lectures/ practicals	Written exam & practicals	400
Science and communication	AM_470587	6	1	Lectures/ workgroups	Written exam/ assignments	500
Science Journalism	AM_471014	6	2	Lectures/ seminars	Written exam/ assignments	500
Sedimentary Environment and Climate Archives	AM_450330	6	1	Lectures / workshops	Written exam	400
Sediment Petrography of Heavy Minerals *	AM_450058	3	3	Lectures/ practicals	oral	400
Sociale geografie II	AM_1051	12	4,5,6	tutorials	*	400
Sustainable Energy Analysis	AM_468018	6	1	Lecture/ team assignment/ workshop	Written exam/ presentation	400
Unsaturated zone and near-surface processes	AM_450021	6	2	Lectures / workshops	Written exam/ modelling report	400
Volcanism	AM_450061	3	3	Lectures/ exercises	Written exam/ exercises	*

\*These course modules are offered every other year

If the student wishes to take a different course than the units of study listed, permission must be obtained in writing from the Examinations Board prior to the start of the course

#### Article 4.5 Sequence of examinations

1. Students may participate in examinations for the units listed below only if they have passed the examination or examinations for the units mentioned.
2. On the grounds of a motivated request by the student, the Examination Board may grant an exemption to the conditions stipulated in Article 4.5.1 of these regulations

Course code	Subject	entry requirements
AM_1147	Master Thesis Earth Surface Processes, Climate and Records	registration of at least 36 EC of the specialization concerned
AM_1150	Master Thesis Earth Sciences and Economics	registration of at least 36 EC of the specialization concerned
AM_1186	Master Thesis Geology and Geochemistry	registration of at least 36 EC of the specialization concerned
AM_450170	Reflection Seismics	AM_450179 Petroleum Systems and Regional Geology
AM_1103	Research Project Earth Sciences and Economics	registration of at least 18 EC of the specialization concerned
AM_1149	Research Project ESPCaR	registration of at least 18 EC of the



		specialization concerned
AM_1185	Research Project Geology and Geochemistry	registration of at least 18 EC of the specialization concerned

#### Article 4.6 Participation in practical training and tutorials

1. In the case of a practical, the student must attend 100 % of the practical sessions. Should the student attend less than 100 %, he/she must repeat the practical, or the examiner of the course may issue one or more supplementary assignments.
2. In the case of a work group with assignments, the student must attend 100 % of the work group sessions. Should the student attend less than 100 %, he/she must repeat the work group, or the examiner of the course may issue one or more supplementary assignments.
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

A maximum of 40 EC of the curriculum can be accumulated through granted exemptions.

- 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

As laid down in article 4.8 of TER part A.

#### 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 from the relevant Board of Studies. A copy of the advice will be sent to the authorised representative advisory body.
2. An amendment to the Teaching and Examination Regulations requires the approval of the authorised representative advisory body if it concerns components not related to the subjects of Section 7.13, paragraph 2 sub a to g and v, as well as paragraph 4 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. **Specialisations replaced in academic year 2015-2016**  
The specialization *Solid Earth* has been replaced by specialization *Geology and Geochemistry*
2. **Compulsory components replaced in academic year 2015-2016**  
The compulsory components below have been replaced in academic year 2015-2016

New component(s)	Former component(s)
AM_1185 Research Project Geology and Geochemistry	AM_450200 Research Project Solid Earth (27 EC)
AM_1186 Master Thesis Geology and Geochemistry	AM_450199 Master Thesis Solid Earth (27 EC)

AM_1183 Imaging and Assessing Landscapes (6 EC)	AM_450403 Imaging the Earth Surface (3 EC) and AM_450404 Assessing the Landscape (3 EC)
Research Internship Science Communication (30 EC) <i>or</i> Reflective Practice Internship Science Communication (30 EC)	Research Project Science Communication (21 EC) <i>and</i> Literature Study Science Communication (9 EC)
Praktijk 1, O_MLPRAK_1, 6 EC Praktijk 2, O_MLPRAK_2, 9 EC Praktijk 3, O_MLPRAK_3, 15 EC Didactiek 1, O_MLDIDAC_1, 6 EC Didactiek 2, O_MLDIDAC_2, 6 EC Didactiek 3, O_MLDIDAC_3, 6 EC Praktijk onderzoek 1, O_MLPROZ_1, 3 EC Praktijk onderzoek 2, O_MLPROZ_2, 6 EC	Algemene Didactiek en Pedagogiek I Algemene Didactiek en Pedagogiek II Praktijk I Praktijk II Vakdidactiek aardrijkskunde I Vakdidactiek aardrijkskunde II Professionele Ontwikkeling en Onderzoek I Professionele Ontwikkeling en Onderzoek II Verdieping

### 3. Compulsory components replaced in academic year 2014-2015

The compulsory components below have been replaced in academic year 2014-2015

New component	Former component
AM_1124 Modern Climate and Geo-ecosystems (6 EC)	AM_450185 Modern Climate Systems (3 EC) and AM_450313 Modern Geo-ecosystems (3 EC)
AM_1144 Practical Paleoclimate Change and Environmental Impacts (6 EC)	AM_450266 Practical Paleoclimate Change and Environmental Impacts (3 EC) and AM_450054 Paleoecology/palynology (3 EC)
AM_1149 Research Project ESPCaR (27 EC)	AM_450267 Research Project Applied Environmental Geosciences (24 EC)
AM_1149 Research Project ESPCaR (27 EC)	AM_450202 Research Project Palaeoclimate and Geo-ecosystems (27 EC)
AM_1147 Master Thesis ESPCaR (24 EC)*	AM_450268 Master Thesis Applied Environmental Geosciences (27 EC)
AM_1147 Master Thesis ESPCaR (24 EC)*	AM_450201 Master Thesis Palaeoclimate and Geo-ecosystems (24 EC)
AM_1150 Master Thesis Earth Sciences and Economics (24 EC)	AM_450407 Master Thesis Earth Sciences and Economics (27 EC)

\* Students who started their specialization programme Applied Environmental Geosciences or Palaeoclimate and Geo-ecosystems can select their master thesis according to these respective programmes..

From 1 September 2014 students complete the new research project or thesis unless they already started the former component.

Students who started their programme before academic year 2014-2015 are, under specific conditions, permitted to replace compulsory courses by a different compulsory course from the former examination programme as detailed below.

a. For students who started Palaeoclimate and Geo-ecosystems (PG) in 2013-2014 or earlier:

Compulsory course	Permitted replacement course
AM_450332 Global Biogeochemical Cycles (6 EC)	AM_450313 Modern Geo-ecosystems (3 EC)

b. For students who started Applied Environmental Geosciences (AEG) in 2013-2014 or earlier:

Compulsory course	Permitted replacement course
AM_450226 Basics in GIS (3 EC)	AM_450313 Modern Geo-ecosystems (3 EC) or AM_450187 Man and Climate: From Hominids to Modern Civilisation (3 EC) or AM_450004 Climate Modelling (3 EC) or AM_450188 Climate and Policy (3 EC)

c. Students who started ES&E in 2013-2014 or earlier fulfill the requirements for Earth Science oriented and Economics oriented courses with the following courses, in addition to the ones mentioned under 4.2.2:

Earth Science oriented:

- AM\_450137 Aquatic Ecology (6EC)
- AM\_468019 Energy Systems Transitions (6EC)
- AM\_450187 Man and Climate: From Hominids to Modern Civilisation (3EC)
- AM\_450313 Modern Geo-ecosystems (3EC)
- AM\_450170 Reflection Seismics (6EC)
- AM\_450330 Sedimentary Environments and Climate Archive (6EC)
- AM\_1030 Soil and Environment (6EC)
- AM\_450294 Capita Selecta Geoarchaeology (3EC)

Economics oriented:

- AM\_450188 Climate and Policy
- AM\_468018 Energy Technology Assessment
- E\_STR\_IEE International Environmental Economics
- AM\_468023 Water and Policy

#### 4. **Compulsory components that do not apply for students that started before 2014-2015**

For students who started their programme before academic year 2014-2015 the courses below are not compulsory:

For students who started ES&E in 2013-2014 or earlier the courses below are not compulsory:

- AM\_468023 Water and Policy (6 EC)
- AM\_450409 Geothermal Energy (6 EC)
- E\_STR\_ECC Economics of Climate Change (6 EC)

Students that have already successfully completed the course(s) before 1 September 2014 can use this as (an) elective (free optional) course(s)

#### 3. **Electives**

The courses below are no longer available in the programme but are still elective components for students who started their programme in or before the academic year in which the course was taught last and have passed the courses' examinations:

*Courses last offered in academic year 2014-2015*

- AM\_450052 Hydrochemistry (6 EC)
- AM\_1012 Hydrological Systems and Water Management (3 EC)
- AM\_450148 Isotope Hydrology (3 EC)
- AM\_450158 Microstructures in Tectonites (6 EC)
- AM\_450131 Transport Processes in Groundwater (6 EC)
- AM\_450227 Applied GIS (3 EC)

*Courses taught offered in academic year 2013-2014*

- AM\_450137 Aquatic Ecology (6 EC)
- AM\_1015 Sustainable Land Management (6 EC)
- AM\_450292 Historical Geography (6EC)
- AM\_1030 Soil and Environment (6EC)
- AM\_450294 Capita Selecta Geoarchaeology (6 EC)
- AM\_450180 Low Temperature Deformations (3 EC)

The specializations below can no longer be started.

- Applied Environmental Geosciences
- Palaeoclimatology and Geo-ecosystems

Students who started the specializations before academic year 2014-2015 and have passed the specialization specific courses' examinations, can still graduate in the above mentioned specializations.

**4. Total of at least 120 EC**

The final examination programme should always total at least 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 the faculty website and deemed to be included in the course catalogue.

**Article 5.4 Effective date**

These Regulations enter into force with effect from 1 September 2015

Advice from Board of Studies, 1 July 2015

Approved by authorised representative advisory body on 15 July 2015

Adopted by the faculty board on 21 August 2015