

Academic and Examination Regulations (AER)

MASTER'S PROGRAMME in

Biology

Biomedical Sciences

Biomolecular Sciences

Earth Sciences

Ecology

Environment and Resource Management

Geosciences of Basins and Lithosphere

Global Health

Health Sciences

Hydrology

Lifestyle and Chronic Disorders

Management, Policy Analysis and Entrepreneurship in the Health and

Life Sciences

Neurosciences

Academic year 2013-2014

VU University Amsterdam
Faculty of Earth and Life Sciences

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A. Faculty Section

Section 1 General provisions

Article 1.1 Scope of application of these regulations

1. These regulations apply to the educational activities associated with and examinations of the Master's programmes in:
ISAT- Master programme
code
66860 Biology
66990 Biomedical Sciences
60616 Biomolecular Sciences
66986 Earth Sciences
60607 Ecology
60045 Environment and Resource Management
65000 Geosciences of Basins and Lithosphere (research) (joint degree)
66903 Global Health (research)
66851 Health Sciences
60807 Hydrology
60368 Lifestyle and Chronic Disorders (research)
60803 Management, Policy Analysis and Entrepreneurship in the Health and Life Sciences
60806 Neurosciences
hereinafter referred to as: 'the programmes'.
2. These regulations consist of a faculty section (A) and a programme-specific section (B). Section A contains general provisions and applies to the educational activities and examinations of the Master's programmes of the Faculty of Earth and Life Sciences. Section B contains programme-specific provisions. Together, Section A and Section B constitute the Academic and Examination Regulations of the programme, as referred to in Section B
3. The programmes are offered by the Faculty of Earth and Life Sciences of VU University Amsterdam, hereinafter referred to as: 'the faculty'.
4. These regulations apply to anyone following the programme during this academic year, irrespective of when he or she started the programme. Where necessary, transitional regulations will apply. These are appended to these regulations.
5. Any provision in the programme-specific section of the Academic and Examination Regulations, or any regulation or any decision by the Examination Board, an examiner or the Admissions Board which is in conflict with the law or with this faculty section of the OER shall be invalid.

Article 1.2. Definitions

If the terms used in these regulations also occur in the Higher Education and Research Act (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*, WHW), the meaning given in this Act will prevail. These regulations use the following definitions:

Specialization	A coherent section of course components in a programme that has its own clearly defined final qualifications
The Act:	The Higher Education and Research Act, abbreviated as WHW.
Admissions Board	The body that acts on behalf of the Executive Board or Faculty Board to assess whether an applicant may be admitted to the programme.
(Programme)	A programme component as defined in Article 7.3, paragraphs 2 and 3 of

Component	the Act.
Blackboard	Electronic system intended for the sharing of educational information.
Constituent examination	See definition of 'examination', only applied to a separate part of the educational unit
Disability	A disorder of a temporary or permanent nature which affects the student's ability to follow the programme or to complete examinations or practicals.
EC	European Credit, a unit of 28 study load hours, in accordance with the European Credit Transfer System.
Examination	An investigation into the knowledge, insight and/or skills of the student relating to a particular part of the degree programme
Executive Board Institution	College van bestuur VU University Amsterdam
Language of instruction	The language of tuition in the programme
Practical	A practical educational exercise as defined in Article 7.13, paragraph 2d of the Act, for example in the following forms: <ul style="list-style-type: none">- writing a thesis;- preparing an assignment, paper, project or prototype;- conducting a design or research assignment;- conducting a literature review;- completing a work placement/internship;- participation in fieldwork or an excursion;- conducting tests; or participation in other educational activities with the aim of developing specific skills;
Programme specific section	The part of the Academic and Examination Regulations relating only to the relevant programme;
Study guide	The guide for the programme containing specific information relating to it.
Semester	Part of the academic year, starting on 1 September and ending on a date to be determined by the Executive Board [around 31 January], or starting on [a date stipulated in advance by the Executive Board] and ending on 31 August.
Working day	Monday to Friday, except for public holidays or days designated as holidays by VU University Amsterdam.

Article 1.3 Aim of the programme

1. The programme aims to achieve the following: (see also 'Final Attainment Levels' in the appendices)
 - to prepare the student to practice professionally within the disciplines covered by the master's programme,
 - to teach the student specialized knowledge, skills and understanding in the field of the programme
 - to prepare the student for academic work in the field of the programme
2. The programme also promotes the academic education of the student, in particular with reference to:
 - independent, academic thought processes and performance;
 - communicating at an academic level;
 - applying specialist academic knowledge in a wider and/or philosophical and social context.
3. The programme focuses on the student's personal development and promotes his or her awareness of social responsibility

Article 1.4 Structure of the academic year

1. In each programme, the academic year is divided into two semesters.

Article 1.5 Study load and programme types

The table represents an overview of the study load (in EC), the programme types (full-time/part-time) and the length (in academic years)

Master programme	Study load (in EC)	full-time/part-time	Number of academic years programme
M Biology	120	full-time basis	Two-year programme
M Biomedical Sciences	120	full-time basis	Two-year programme
M Biomolecular Sciences	120	full-time basis	Two-year programme
M Earth Sciences	120	full-time basis	Two-year programme
M Ecology	120	full-time basis	Two-year programme
M Environment and Resource Management	60	full-time basis	One-year programme
M Geosciences of Basins and Lithosphere (research) (joint degree)	120	full-time basis	Two-year programme
M Global Health (research)	120	Full-time basis	Two-year programme
M Health Sciences	60	full-time basis	One-year programme
M Hydrology	120	full-time basis	Two-year programme
M Lifestyle and Chronic Disorders (research)	120	full-time basis	Two-year programme
M Management, Policy Analysis and Entrepreneurship in the Health and Life Sciences	120	full-time basis	Two-year programme
M Neurosciences	120	full-time basis	Two-year programme

Section 2 Admission to the programme

Article 2.1 Admissions Board

1. Responsibility for admitting students to the programme, including the distinct programmes, is delegated to the Admission Board of the programme by the Faculty Board.
2. The Faculty Board is responsible for drawing up the Admissions Regulations.

Article 2.2 English Language Requirement

1. For admission to an English-language Master's programme, the applicant must complete a certified English-language test before beginning the programme.
2. The minimum requirements for students' English language proficiency are IELTS 6.5 or a score of A or B on the Cambridge Certificate of Proficiency in English (CPE) or the Cambridge Certificate of Advanced English (CAE) A, B & C.
ITP-TOEFL or TOEFL paper based test: 580
ITP-TOEFL or TOEFL computer based test: 237
ITP-TOEFL or TOEFL internet based test: 92-93
3. The following are exempt from this test:
 - anyone who has passed all the distinct components of an English test (IELTS/TOEFL) no longer than one year before commencement of the programme, with a score that at least equals the one mentioned in article 2.2.2;
 - anyone who has met the requirements of the VU English language proficiency test: TOEFL ITP;
 - anyone who has received a degree in the English language in an English-speaking country included on the relevant list issued by the International Office;
 - anyone who holds a Bachelor's degree for which this Master's programme has been

designated as an official follow-up Master's as described in the programme specific section.
- anyone who holds a bachelor degree of a partner institution of a joined degree is allowed to use institutional TOEFL's / pre defined tests organized by the partner institutions to gain acceptance.

4. The Examination Board may grant exemption from admission requirements regarding the command of English provided that students have sufficiently developed their mastery of English as their mother tongue, either during previous education, or have proven so by other means.

Article 2.3 Admission to the programme

1. Students will be admitted to the programme if they hold a certificate of admission, issued by or on behalf of the Faculty Board because they have demonstrated that they meet the knowledge, understanding and skills requirements reflecting the final level of attainment in a relevant academic Bachelor's programme.
2. The certificate of admission relates exclusively to the academic year following the academic year in which the application for the certificate was submitted, unless the Executive Board decides otherwise.
3. The specific admission requirements of the master programmes are specified in the appendix of the master programme concerned.

Article 2.4 Restrictions on the number of students admitted to Master's programmes

1. At the latest, four months before the deadline for applications, specified in the Application and Registration Regulations, the Faculty Board can submit a proposal to the Executive Board specifying the maximum number of students to be admitted to the programmes.
2. If a restriction on numbers applies, the Examination Board will determine a series of criteria to rank the applications submitted. These criteria are public and will be announced well before the selection dates.
3. The Examination Board will then offer admission to the candidates in the order of ranking.

Section 3 Composition of the programme

Article 3.1 Composition of the programme

1. The programme will comprise the components listed in the programme-specific section of the Academic and Examination Regulations.

Article 3.2. Flexible degree programme

1. Instead of taking the standard programme, a student may ask the relevant Examination Board for permission to take a programme which he or she has composed from educational units taught at VU University Amsterdam or at another institution of higher education. This 'free programme' must satisfy the requirements of a Master's degree programme and lead to a final degree assessment. This programme must equal or surpass the scope, range and depth of a standard Master's programme and it requires prior permission from the Examination Board. A free programme does not give the student the legal status required by the legal profession or judiciary.

Section 4 Exemption, examination and final degree assessment

Article 4.1 Exemption

1. After consulting the relevant examiner, the Examination Board may grant exemption from an examination or practical, based on the following:
 - a an examination or practical successfully completed in the past within higher education in the Netherlands or elsewhere, which in terms of content, level and study load is at least equivalent to the requirements of the component from which exemption is sought.
 - b knowledge and/or skills acquired outside higher education, which in terms of content level and study load are at least equivalent to the requirements of the component from which exemption is sought.
 - c exemption on grounds of conscience: the Examination Board determines additional requirements the student has to meet.
2. Prior approval is required from the Examination Board if a student wishes to meet the requirements for specific examinations by studying at a different faculty or (Dutch or foreign) university.
3. The examination board can grant a student exemption from components of the examinations to a maximum amount of 20 EC within the one-year Master's programmes and 40 EC within the two-year Master's programmes.
4. No exemptions can be granted for a thesis or final assignment.

Article 4.2 Types of examinations

1. The examinations will be taken in the manner described in the online study guide for the programme.
2. If no indication is provided with regard to the manner in which an examination may be taken, because this concerns a subject not provided by the programme itself, that which is stipulated in the study guide for the relevant programme will apply.
3. The Examination Board can deviate from that which is stipulated in paragraph 1. A request to do so can be submitted by the student or by the examiner.

Article 4.3 Examinations and resits

1. The Examination Board appoints the examiners.
2. An educational unit may consist of a number of components. Each component is completed with a constituent examination. The final grade for the educational unit is determined on the basis of the predetermined weight of the constituent examinations.
3. Prior to the start of the semester, a timetable is issued detailing when written examinations and constituent examinations may be taken. This timetable covers all educational units taught in that semester and is published no later than the beginning of the semester.
4. The programme-specific section may stipulate that students are not permitted to sit an examination or constituent examination until they have passed another examination or constituent examination.
5. In exceptional circumstances, the Examination Board may decide to deviate from the sequence referred to in paragraph 5.

Article 4.4 Oral examinations

1. Unless specified otherwise by the examiner, no more than one student at a time will sit an oral examination.

2. At a student's or lecturer's request a second lecturer can attend an oral examination.
3. Oral examinations will be public unless decided otherwise by the Examination Board or the relevant examiner in exceptional cases. Students can submit a corroborated objection against the examination being held in public to the Examination Board. The Examination Board will weigh the student's objection against the interests of holding a public examination.
4. Before the commencement of an oral interim examination, the examiner will ask the student for valid proof of enrolment.

Article 4.5 Assessment

1. Examinations are assessed on the basis of written assessment criteria that are published in advance. Subject to the approval of the Examination Board, the examiners may revise the assessment standards applied based on the work submitted
2. Students are deemed to have passed the examination if they meet the prescribed standards as determined by the examiner.
3. Written Assessments will take place in such a way that the students can verify how their examination results were established.
4. If a written examination is made up of several components, no assessment will be made of this examination until all components have been tested.
5. The assessment of a work placement/internship or a research assignment will be issued by the examiners after consultation with the relevant supervisor on site.

Article 4.6 Determining and publishing examination results

1. The examiner will determine the results of the written examination as soon as possible, but at the latest within 15 working days after the examination has been taken. The examiner will provide the faculty education office with the relevant information. The faculty Education Office will ensure that the results are recorded and published within 20 working days after the examination has been taken, with due regard for the student's privacy.
2. If, due to exceptional circumstances, the examiner is likely to exceed the deadline, he or she must inform the Examination Board, stating reasons. The Examination Board will then ensure that the student is informed of the new deadline.
3. The examiner will determine the result of an oral examination immediately after the examination in question and will give the student a written explanation of this decision.
4. If a student re-sits an examination, the highest mark will count.
5. With regard to examinations that are neither written nor oral, the Examination Board will decide in advance how the student will be informed of the results and how long that will take.
6. When notified of the result for an examination, the student will also be informed of the right of inspection as referred to in Article 4.8, as well as the option of appealing to the Examination Board.
7. In the event that the Examination Board ascertains that a student has committed academic misconduct, it is entitled to take measures against the student.

Article 4.7 Period of validity of results

1. The validity of examination results and exemptions from examinations is unlimited
2. The validity of the results of a constituent examination is limited to the academic year in which it took place, unless the programme-specific section for the relevant educational unit states otherwise.

3. As an exception to this rule, in cases where it has been over six years since the student successfully completed the examination in a given component, the Examination Board may decide that he or she is required to sit an additional or replacement examination in that component before being permitted to sit the final examination.

Article 4.8 Right to inspection

1. For a period of at least 20 working days following publication of the results for a written examination, the student will be given the opportunity to inspect his or her assessed work. If a student intends to appeal against the way in which his or her work has been assessed, he or she will be issued with a copy of the assessed work at cost price.
2. During the period specified in the first paragraph, the student who took part in the examination can be informed of the questions and assignments in the examination in question, as well as the standards against which the assessment was conducted.
3. The Examination Board has the right to determine that the inspection referred to in paragraphs 1 and 2 takes place at a given location and at a fixed time.
4. If the student can demonstrate that he or she is or was unable to attend at the place and time indicated, he or she will be granted another opportunity to do so.
5. The location and time indicated in paragraph 3 will be announced well in advance and at least one week before the specified time.

Article 4.9 Reflective discussion of examinations

1. As soon as possible after the results of an oral examination have been announced, a reflective discussion will be held between the examiner and the student at the request of the student or on the initiative of the examiner. In this discussion, the examiner will provide a justification for the assessment given
2. For a period of 20 working days after the publication of the results of a written examination, the student may request a reflective discussion with the relevant examiner. The reflective discussion will take place within a reasonable period at a time and location determined by the examiner.
3. If the Examination Board organizes or arranges a collective reflective discussion, students may only submit a request as stipulated in the previous paragraph if they have been unable to attend the collective discussion for reasons beyond their control.
4. That stipulated in paragraph 3 applies *mutatis mutandis* if the Examination Board or the examiner offers the student the opportunity to compare his or her answers with model answers.
5. The Examination Board can decide to permit exceptions to the provisions in paragraphs 2 and 3.

Article 4.10 Resits

1. There are two opportunities to take examinations in the programme in each academic year: the first time immediately following the teaching period in which the subject is offered; the second time during the resits period.
2. Without prior permission from the Examination Board, students may sit a given examination no more than four times. When the maximum of four examinations has been reached, without successful completion of the examination in question, the Examination Board will determine whether, and under which conditions the candidate can be admitted to future examinations. Requests for admission should be submitted in writing.
3. Details concerning the period in which written examinations may be taken are included in

- the year schedules. These will be published well in advance (at the latest July 15).
4. If no indication is provided with regard to the number of times an examination may be taken in each academic year, because this concerns a subject not provided by the programme itself, the Academic and Examination Regulations for the relevant programme will apply.
 5. In exceptional cases, the Examination Board may issue permission for the rules regarding the number of times in which examinations may be taken, to be waived.
 6. Notwithstanding the provisions of the paragraph 1, participation in a practical component is possible only once a year.
 7. Deadlines for submission of reports of programme components that are subject to the work placement and thesis regulations (as listed in Appendix A) have to be incorporated in the agreement form (available at the website of the faculty),

Article 4.11 Final examination

1. If the examinations for the programme components relating to the programme have been completed successfully, then the final examination has been completed.
2. Students who have successfully completed the final examination will be conferred the title 'Master of Science' by the Executive Board.
3. Details of the degree awarded will be recorded on the degree certificate in question. In relevant cases, details of the degree can be recorded in the diploma supplement.

Article 4.12 Practical components

1. In addition to, or instead of, classes in the form of lectures, the elements of the Master's examination programme often include a practical component, as defined in Article 1.2. The online study guide contains information on the types of classes used in each part of the programme. Attendance during practical components is mandatory.
2. When performing practical components, students must adhere to the faculty's safety regulations.
3. The faculty has a Student Placement (Internship) and Research Project Regulations for course components in which the student carries out research tasks more or less independently and which are concluded with the writing of a report. The Student Placement (Internship) and Research Project Regulations are drawn up by the Faculty Board. The Student Placement (Internship) and Research Project Regulations govern the course components as listed in appendix A.
4. The responsible supervisor may request the Examination Board to allow him/her (the supervisor) permission to assess the results of the research project to be 'insufficient' and to finish the project if the student does not provide a complete and correctable first draft of a report with the research results within a period of ultimately 12 months after the starting date of the research project. The Examination Board will explicitly inform the student about procedures for appeal against such a decision.
5. In conducting its teaching activities, the Faculty of Earth and Life Sciences makes no distinction in terms of age, gender, religion, sexual orientation, or ethnicity. One of the implications of this is that no claim can be made to material or immaterial facilities which conflict with this principle.

Section 5 - Study advice

Article 5.1 Records of study progress

1. The Faculty Board will ensure records are kept of study results in order to enable students to consult VUnet at any time for details of the results they have achieved for the various teaching components in the programme.

Article 5.2 Study advice

1. The Faculty Board will ensure that students enrolled in the programme are provided with study advice. The faculty possesses a policy document on study advice.

Article 5.3 Adaptations for students with disabilities

1. Students with a disability may qualify for special adaptations to the teaching provided, examinations and practicals, based on a written request submitted for that purpose to the study advisor. These adaptations will be tailored as far as possible to the individual disability of the student, but are not permitted to affect the quality or level of difficulty of the subject or final examination programme. The facilities available for this purpose may consist of examinations and/or practicals whose nature and duration is attuned to the situation of the individual concerned, or providing practical aids.
2. The request referred to in paragraph 1 must be submitted via the study advisor and accompanied by a recent recommendation from a student counsellor. This recommendation is based on a statement from a doctor or psychologist. In the case of dyslexia, no recommendation from a student counsellor is required and a statement from a BIG, NIP or NVO accredited testing centre will suffice. Where possible, the statement should include an estimation of the extent to which progress of study will be hindered.
3. If the student's disability constitutes grounds for an extension of examination time, the study advisor provides a statement which demonstrates the need for extended time for examinations.
If the student's disability gives rise to the need for other provisions, the study advisor can assign a VIB-pass. This pass will show clearly which facilities the holder is entitled to.
4. A statement as referred to in paragraph 2, or VIB-pass is valid for a maximum of one year. In the case of a chronic disorder, this period of validity may be extended at the recommendation of a student counsellor.
5. The Faculty Board will decide on any requests for adaptations relating to the educational facilities. The Examination Board will decide on any requests for adaptations relating to the process of examining.

Section 6 – Transitional and final provisions

Article 6.1 Conflicts with the regulations

1. If a study guide or other regulations relating to the programme or the examination programme are in conflict with these regulations, then the provisions in these regulations will take precedence.

Article 6.2 Amendments to the regulations

1. Amendments to these regulations take place following a recommendation by the programme committee relating to the regulations in their entirety, and with the

endorsement of a joint meeting of those sections which do not relate to the subject of Article 7.13 paragraphs 2 a to g, and paragraph 3 (follow-up Master's) of the WHW and the admission requirements for Master's programmes.

2. An amendment to the Academic and Examination Regulations may only relate to an academic year already in progress if the interests of the students are not demonstrably harmed.

Article 6.3 Transitional Regulations

1. In the event that substantive changes are made to the composition of the study programme or to the contents of these regulations, the Faculty Board will draft transitional regulations which will be appended to these regulations.
2. These transitional regulations will always include:
 - a. regulation relating to exemptions that may be awarded on the basis of examinations already secured;
 - b. the period of validity of the transitional regulations.
3. If a subject in the compulsory study programme is discontinued, a further (one) opportunity will be offered after the final teaching in the subject to sit the examination in the subject. Resits will take place in the academic year subsequent to the final academic year in which teaching in the subject was offered.
If, however, a study component is offered that is to a large extent similar to the one that is being discontinued, the faculty may deviate from the above mentioned procedure.

Article 6.4 Hardship clause

1. In cases where the Academic and Examination Regulations do not provide and where there is disproportionate disadvantage or significant unfairness, the relevant Programme Board will decide, having consulted the Examination Board, taking into account the scope of the Academic and Examination Regulations and the due exercise of administrative diligence, reasonableness and fairness.

Article 6.5 Publication

1. The Faculty Board will ensure that these regulations are published in an appropriate manner, at the latest on 31 August of the before the regulation comes into force.. This also applies to the rules and guidelines drawn up by the Examination Board, and to any amendments to these documents
2. The Education Office will furnish any interested parties with a copy of the documents referred to in the first paragraph.

Article 6.6 Entry into force

1. These regulations come into force on 1 September 2013
Adopted by the Board of the Faculty of Earth and Life Sciences on 11 July 2013.

Appendix A Practical components master programmes

The following practical components are subject to the work placement and thesis regulation (see table:)

Master programme	Course component
M Biology	<i>Non Research programmes</i> AM_471148 Internship Communication Specialization AM_471156 Internship Education Specialization AM_471147 Internship Societal Specialization <i>Research programmes</i> AM_471151 Internship Brain and Behaviour AM_471150 Internship Ecology AM_1107 Internship Green Life Sciences
M Biomedical Sciences	<i>Non Research programmes</i> AM_471145 Internship Communication Specialization AM_471143 Internship Education Specialization AM_471147 Internship Societal Specialization <i>Research programmes</i> AM_471136 Internship Cardiovascular Diseases AM_471137 Internship Immunology AM_471138 Internship Infectious Diseases AM_471139 Internship International Public Health AM_471142 Internship Med. And Behavioural Genomics AM_471140 Internship Psychophysiology
M Biomolecular Sciences	AM_471129 Internship I Biological Chemistry AM_471130 Internship II Biological Chemistry AM_471127 Internship I Molecular Cell Biology AM_471128 Internship II Molecular Cell Biology
M Earth Sciences	AM_1103 Research project Earth Sciences and Economics AM_450407 Master Thesis Earth Sciences and Economics AM_450202 Research Project Paleoclimatology and Geo-ecosystems AM_450201 Master Thesis Paleoclimatology and Geo-ecosystems AM_450296 Research Project Archaeometry AM_450300 Master Thesis Archaeometry AM_450295 Research Project Landscape Archaeology AM_450298 Master Thesis Landscape Archaeology AM_450267 Research Project Applied Environmental Geosciences AM_450268 Master Thesis Applied Environmental Geosciences AM_450200 Research Project Solid Earth AM_450199 Master Thesis Solid Earth
M Ecology	AM_1108 Research Project Environmental Chemistry and Toxicology I AM_1113 Research Project Environmental Chemistry and Toxicology II AM_1100 Research Project Ecology and Evolution I AM_1114 Research Project Ecology and Evolution II
M Environment and Research Management	AM_468017 – Research Project
M Geosciences of Basins and Lithosphere	AM_1105 Research Project GBL I AM_1106_ Research Project GBL II AM_450271 Master Thesis Geosciences of Basins and Lithosphere
M Global Health	AM_1102 Research Project Global Health year 1 AM_1115 Research Project Global Health year 2
M Health Sciences	AM_471105 Internship Infectious Diseases and Public Health AM_471106 Internship International Public Health

	AM_471107 Internship Nutrition and Health AM_1109 Internship Health Policy AM_471104 Internship Prevention and Public Health
M Hydrology	AM_1104 Master Thesis Hydrology
M Lifestyle and Chronic Disorders	AM_471100 Internship LCD AM_471101 First Internship LCD AM_471102 Second Internship LCD
M Management Policy Analysis and Entrepreneurship for Health and Life Sciences	AM_471116 Internship I MPA AM_471117 Internship II MPA AM_471124 Internship I MPA Communication AM_471125 Internship II MPA Communication AM_471118 Internship I MPA Management and Entrepreneurship AM_471119 Internship II MPA Management and Entrepreneurship AM_471122 Internship I MPA Policy AM_471123 Internship II MPA Policy AM_471120 Internship I MPA International Public Health AM_471121 Internship II MPA International Public Health
M Neurosciences	AM_471108 Internship Neurosciences I AM_471109 Internship Neurosciences II

B PROGRAMME-SPECIFIC SECTION

1 BIOLOGY

1.1 Final attainment levels

Dublin descriptor 1: Knowledge and understanding The graduate should have specialized theoretical and practical knowledge of Biological Science notably within the field of his/her specialization.
The graduate: <ol style="list-style-type: none">1 masters the fundamental concepts of modern biology and understands the state of the art in terms of developing theories and insight into the most important current research issues in the biological discipline in which the student has specialized.2 appreciates the place of this sub discipline within the biological and natural sciences.3 is able to appreciate the scientific and social relevance of biology, and of current research in the area of specialization.4 is able to think in multidisciplinary terms, and possesses an understanding of other disciplines (and sub-disciplines) that are of importance to biology.5 has command of advanced research techniques, laboratory procedures and (statistical) methodology necessary for the specialization.

Dublin descriptor 2: Application of knowledge The graduate should be experienced in carrying out research, in applying techniques specific to the subject area and in applying scientific knowledge to problems raised in society.
The graduate: <ol style="list-style-type: none">1 is able to design experiments in the different fields associated with Biology notably within the field of his/her specialization and analyse their results.2 has knowledge about the methodology used within research of the field of his/her discipline and can apply independently these methods in research.3 is able to apply his/her scientific knowledge to social questions.4 can think multidisciplinary and has insight in the relevant (sub)disciplines that are important to his/ her specialization.5 is able to reflect on the ethical aspects of research or its uses, and include these deliberations in the decision-making process.6 adopts an attitude towards the correct and unbiased use and presentation of data.

Dublin descriptor 3: Critical judgement The graduate should be able to independently and critically judge information.
The graduate: <ol style="list-style-type: none">1 is able to independently acquire information in the field of his/ her specialization, and to analyze and critically evaluate such information.2 is able to select and order information, to distinguish essentials from trivialities, and to recognize connections.3 is able to independently and critically analyze research in the field of his/ her specialization, both in relation to its design, planning and execution, and to the results obtained.4 has the ability to evaluate his/her own performance, both introspectively and in discussion with others.

Dublin descriptor 4: Communication The graduate should be able to transfer knowledge and skill related to his/her subject area to other persons and to adequately reply to questions and problems posed within
--

society.

The graduate:

- 1 can report orally on research results in English with support of modern presentation techniques.
- 2 can report in written form on research results on the level of peer-reviewed academic journals.
- 3 can make essential contributions to scientific discussions about plans, results and consequences of research.
- 4 can collaborate with researchers from other disciplines.

Dublin descriptor 5: Learning skills

The graduate should develop learning skills that enable him/her further self education and development within the subject area.

The graduate:

- 1 is able to understand and summarize scientific literature within the field of his/ her specialization.
- 2 is able to draw up a research plan, giving details of experimental design, execution and analysis.
- 3 is familiar with general scientific journals such as Nature and Science, and with journals in the area of his/ her specialization.
- 4 is familiar with computer software that is relevant to the field.
- 5 has been able to influence his/her personal learning process by the choice of courses.

1.2 Specializations in MSc Biology

The programme contains the following specializations:

Specialization	EC compulsory
I. Research specialization	
a. Ecology	54-60
b. Brain and Behavior	54-60
c. Green Life Sciences	54-60
II Societal specialization	54
III Communication specialization	54
IV Education specialization	60

1.3 Composition of the programme**1.3.1 General setup programme**

1. The Master's examination programme consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

<i>Compulsory</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_471023	Scientific Writing in English	3
AM_470707	Ethics in Life Sciences	3
-	Specialization specific courses (2 x 18 EC)	36

-	Research internship	30-36*
-	Internship (research or work-based)	30-36*
AM_471154	Literature Thesis Biology	9
-	Extension of one placement and/or an optional course	6-9*
	Total	120

- Total credits internships max. 66 credits

- The prescribed scope of the research specializations under subsection 1.3.2 is a minimum of 54 EC and includes a research project (30 EC), and at least 3 course-based elements from the specialist area (18 EC, as described in subsection 7.4) and: an extra optional course (6 EC) and/or an extension of one of the placements (3-6 EC) or a thesis based on literature study in the field of the specialization (9 EC).
- The master's programme can include one or two of the research specializations listed under 1.2, under the additional programme conditions described under paragraph 4 and 5. When a student selects the societal specialization, the education specialization or the communication specialization, he/she has to combine this with one of the research specializations.
- When a student selects one research specialization, he/she has to include the literature thesis (9 EC) within the scope of this specialization.
- When a student selects two research specializations, the subject of literature thesis (9 EC) must be within the scope of one of the two specializations.
- As an alternative, students can opt for a flexible programme

1.3.2 Programme components of research specializations

Specialization Ecology

Compulsory components

code	name	EC
AM_471150	Internship Ecology	30-36

Choose three of the following components

code	name	EC
AM_1039 (UvA)	Spatial Processes in Ecology and Evolution (UvA)	6
AM_1018 (UvA)	Current Topics in Ecolution	6
AM_470505	Experimental Design and Analysis (VU)	6
AM_470506	Environmental Genomics and Adaptation (VU)	6
AM_470507	Soil-Plant-Animal Interactions (VU)	6

Subtotal compulsory components 42-48

Elective components

code	name	EC
AM_450137	Aquatic Ecology (VU)	6
AM_470628	Abiotic Stress (VU)	6
AM_470512	Ecotoxicology and Environmental Quality (VU)	6
AM_1038	Evolutionary Dynamics (UvA)	6
AM_470517	Marine Biology and Oceanography (VU)	4
AM_470511	Microbial Ecology (UvA)	6
AM_1016	Masterclasses in Ecology and Evolution (VU)	3

Total EC specialization 54-57*

* see 1.3.1.2

Specialization Brain and Behaviour

Compulsory components

code	name	EC
AM_471151	Internship Brain and Behaviour	30-36
AM_470728	Methods in Behavioural Neurosciences	6
AM_471018	Neurobiology of Animal Behaviour	6

Subtotal compulsory components 42-48

Choose one of the following components

code	name	EC
AM_1001	Neuronal Networks in Vivo	6
AM_470712	System Neuroscience	6

Total EC specialization 54-57*

* see 1.3.1.2

Specialization Green Life Sciences

Compulsory components

code	name	EC
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AM_1107	Internship Green Life Sciences	30-36
Choose three of the following components		
code	name	EC
AM_470628	Abiotic Stress	6
AM_470627	Biotic Interactions (UvA)	6
AM_470613	Developmental Biology	6
AM_470626	Plant Breeding and Biotechnology (UvA)	6

Total EC specialization 54-57*

* see 1.3.1.2

Flexible programme

A flexible programme is a research programme of two years comprised of the compulsory components listed under 1.3.1.1. With regard to optional courses, students may fulfil their programme with selected courses from the specialization programmes within the Master's programme in Biology and educational units defined under 1.3.2. The sequence of the programme is not defined.

1.3.3 Programme components of Societal specialization

The programme of the Societal specialization consists of 54 EC. This specialization may not be combined with the Communication specialization, the Education specialization, or a second Societal specialization.

The specialization must be combined with a research programme in biological research, comprising 57 EC (courses, placement and literature study), and with the general compulsory courses (total 9 EC, listed under 1.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Societal specialization is as follows:

Compulsory components

code	name	EC
AM_471147	Internship Societal Specialization	30-36
AM_470571	Analysis of Governmental Policy	6
AM_470572	Communication, Organisation and Management	6
AM_470582	Qualitative and Quantitative Research Methods	6
Subtotal compulsory components		48-54

Optional components

code	name	EC
AM_470584	Business Management in Health and Life Sciences	6
AM_470585	Clinical Development and Clinical Trials	6
AM_470588	Disability and Health Development	6
AM_470575	Entrepreneurship in Health and Life Sciences	6
AM_470818	Health, Globalisation and Human Rights	6
AM_470589	Policy, Politics and Participation	6
AM_1002	Science in Dialogue	6
Total EC specialization		54*

* see 1.3.1.2

1.3.4 Programme components of Communication specialization

The programme of the Communication specialization consists of 54 EC. This specialization may not be combined with the Societal specialization, the Education specialization, or a second Communication specialization.

The specialization must be combined with a research programme in biological research, comprising 57 EC (courses, Placement and literature study), and with the general compulsory courses (total 9 EC, listed under 1.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Communication specialization is as follows:

Compulsory components

code	name	EC
AM_471148	Internship Communication Specialization	30-36
AM_470587	Science and Communication	6
AM_470582	Qualitative and Quantitative Research Methods	6

Elective components

code	name	EC
AM_471014	Science Journalism	6
AM_470572	Communication, Organisation and Management	6

AM_1002	Science in Dialogue	6
AM_470590	Science Museology	6
Total EC specialization		54*

* see 1.3.1.2

1.3.5 Programme components of Education specialization

The programme of the Education specialization consists of 60 EC. This specialization may not be combined with the Societal specialization or the Communication specialization.

The specialization must be combined with a research programme in biological research, comprising at least 51 EC (courses, Placement and literature study) and with the general compulsory courses (total 9 EC, listed under 1.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Education specialization is as follows:

The Master's programme 'Education' is made up of:

<i>Education content* (60 EC), general setup</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
O-MLADEPI	Algemene didactiek en pedagogiek I	6
O_MLADEPII	Algemene didactiek en pedagogiek II	3
O_MLPRAKI	Praktijk I	15
O_MLAPKII	Praktijk II	15
O_MLVDBII	Vakdidactiek biologie I	3
O_MLVDBIII	Vakdidactiek biologie II	6
O_MLPOOI	Professionele Ontwikkeling en Onderzoek I	3
O_MLPOOII	Professionele Ontwikkeling en Onderzoek II	6
O_MLVERD	Verdieping	3
Total compulsory education components		60

* The course components mentioned under 'Education content' fall under the AER/OER 'Masteropleidingen Leraar Voorbereidend Hoger Onderwijs'. The language of instruction of the Education specialization is Dutch.

1.3.6 Optional components

With regard to optional courses, students may fulfil their biological research programme with selected courses from other specialization programmes within the Master's programme in Biology, as listed under subsection 1.3.2 to 1.3.5. Furthermore, students can choose from courses and capita selecta that are listed in the study guide 2013-2014, and are defined as target audience.

1.4 Deviating from the programme

1. With regard to the capita selecta, students may also take selected subjects and courses from the Master's programmes in Biology, Biomolecular Sciences, Neurosciences and Management, Policy Analysis and Entrepreneurship in the Health and Life Sciences. In order to broaden their knowledge, students may also take selected subjects and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of Research internship. The student must request this in writing before the start of the Research internship. The request must be underpinned by reasons related to the work in question.

1.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
	<i>Non Research programmes</i>	registration of at least 18 EC of the master programme concerned
AM_471148	Internship Communication Specialization	
AM_471156	Internship Education Specialization	
AM_471147	Internship Societal Specialization	
	<i>Research programmes</i>	
AM_471151	Internship Brain and Behaviour	
AM_471150	Internship Ecology	
AM_1107	Internship Green Life Sciences	

1.6 Admission to the programme

Admission to the master programme Biology

- 1.6.1 Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Article 1.6.2 lists all degrees that provide direct admission and article 1.6.3 lists all degrees that are subject to additional requirements.
- 1.6.2 Direct admission is provided to the Master's programme in Biology for students with a Bachelor of Science degree in Biology from a Dutch university.
- 1.6.3 Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than those listed in article 1.6.2, will not receive direct admission to the programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
- 1.6.4 In all cases other than those specified in paragraphs 1 to 3, the final decision rests with the admission board.

1.7 Cancelled programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2012-2013 part of:	2013-2014
AM_471152	Internship Cell Biology	30-36	Specialisation Cell Biology	No resit
AM_471017	History of Life Sciences	3	Compulsory course components	Final resit

2 BIOMEDICAL SCIENCES

2.1 Final attainment levels

Final attainment levels for the programme

<p>Dublin descriptor 1: Knowledge and understanding</p> <p>The graduate should have specialized theoretical and practical knowledge of Biomedical Science notably within the field of his/her specialization.</p> <p>The graduate:</p> <ul style="list-style-type: none"> • masters the fundamental concepts of modern biomedical sciences and understands the state of the art in terms of developing theories and insight into the most important current research issues in the biomedical discipline in which the student has specialized. • appreciates the place of his/her specialization within the biomedical and the natural sciences. • is able to appreciate the scientific and social relevance of biomedical sciences, and of current research in the area of specialization. • is able to think in multidisciplinary terms, and possesses an understanding of other disciplines (and sub-disciplines) that are of importance to biomedical sciences. • has command of advanced research techniques, laboratory procedures and (statistical) methodology necessary for the specialization.
<p>Dublin descriptor 2: Application of knowledge</p> <p>The graduate should be experienced in carrying out research, in applying techniques specific to the subject area and in applying scientific knowledge to problems raised in society.</p> <p>The graduate:</p> <ul style="list-style-type: none"> • is able to design experiments in the different fields associated with Biomedical Sciences notably within the field of his/her specialization and analyze their results. • has knowledge about the methodology used within research of the field of his/her discipline and can apply independently these methods in research. • is able to apply his/her scientific knowledge to social questions. • can think multidisciplinary and has insight in the relevant (sub)disciplines that are important to his/ her specialization. • is able to reflect on the ethical aspects of research or its uses, and include these deliberations in the decision-making process. • adopts an attitude towards the correct and unbiased use and presentation of data.
<p>Dublin descriptor 3: Critical judgment</p> <p>The graduate should be able to independently and critically judge information.</p> <p>The graduate:</p> <ul style="list-style-type: none"> • is able to independently acquire information in the field of his/ her specialization, and to analyze and critically evaluate such information. • is able to select and order information, to distinguish essentials from trivialities, and to recognize connections. • is able to independently and critically analyze research in the field of his/ her specialization, both in relation to its design, planning and execution, and to the results obtained. • has the ability to evaluate his/her own performance, both introspectively and in discussion with others.
<p>Dublin descriptor 4: Communication</p> <p>The graduate should be able to transfer knowledge and skill related to his/her subject area to other persons and to adequately reply to questions and problems posed within society.</p> <p>The graduate:</p> <ul style="list-style-type: none"> • can report orally on research results in English with support of modern presentation

<p>techniques.</p> <ul style="list-style-type: none"> • can report in written form on research results on the level of peer-reviewed academic journals. • can make essential contributions to scientific discussions about plans, results and consequences of research. • can collaborate with researchers from other disciplines.
<p>Dublin descriptor 5: Learning skills</p> <p>The graduate should develop learning skills that enable him/her further self education and development within the subject area.</p>
<p>The graduate:</p> <ul style="list-style-type: none"> • is able to understand and summarize scientific literature within the field of his/ her specialization. • is able to draw up a research plan, giving details of experimental design, execution and analysis. • is familiar with general scientific journals such as Nature and Science, and with journals in the area of his/ her specialization. • is familiar with computer software that is relevant to the field. • has been able to influence his/her personal learning process by the choice of courses.

2.2 Specializations in MSc Biomedical Sciences

The programme contains the following specializations:

I	Research specializations (54-57 EC)
	<p><i>a.</i> specialization Immunology</p> <p><i>b.</i> specialization Behavioral and Medical Genomics</p> <p><i>c.</i> specialization Cardiovascular Diseases</p> <p><i>d.</i> specialization Infectious Diseases</p> <p><i>e.</i> specialization International Public Health</p> <p><i>f.</i> specialization Psychophysiology</p>
II	Societal specialization(54 EC)
III	Communication specialization (54 EC)
IV	Education specialization (60 EC)

2.3 Composition of the programme

2.3.1 General setup programme

1. The Master's examination programme consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

<i>Compulsory</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_471023	Scientific Writing in English	3
AM_470707	Ethics in Life Sciences	3
-	Specialization specific courses (2 x 18 EC)	36
-	Research internship	30-36*
-	Internship (research or work-based)	30-36*
-	Thesis based on literature study	9
-	Extension of one placement or an optional course	6-9

- total credits internships: max 66 EC
2. The prescribed scope of the research specializations under subsection 2.2 is a minimum of 54 EC and includes a research project (30 EC), and at least 3 course-based elements from the specialist area (18 EC, as described in subsection 2.2) and: an extra optional course (6 EC) *or* an extension of one of the placements (6 EC) *or* a thesis based on literature study in the field of the specialization (9 EC)
 3. The master's programme can include one or two of the research specializations listed under 2.2, under the additional programme conditions described under 2.3.1.4 and 2.3.1.5. When a student selects the societal specialization, the education specialization or the communication specialization, he/she has to combine this with one of the research specializations.
 4. When a student selects one research specialization, he/she has to include the literature thesis (9 EC) within the scope of this specialization.
 5. When a student selects two research specializations, the subject of literature thesis (9 EC) must be within the scope of one of the two specializations.
 6. As an alternative, students can opt for a flexible programme.

2.3.2 Research specializations

The described research specialization programmes apply to all first year students who register for a Master's programme for the first time in 2013-2014.

a. Specialization Immunology

Three specialised courses (18 EC, see below) and a Research Placement including thesis (30) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory course</i>	
AM_470656	Advanced Molecular Immunology and Cell Biology	6
AM_471137	Internship Immunology	30-36
	<i>Restricted options (at least 2 are compulsory)</i>	
AM_470655	Clinical Immunology	6
AM_1031	Immunity and Diseases	6
AM_470657	Molecular Infection Biology	6

b. Specialization Psychophysiology

Three specialised courses (18 EC, see below) and a Research Placement including thesis (30-36 EC) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_1003	Advanced Human Neurophysiology	6
AM_470715	Functional Brain Imaging	6
AM_471140	Internship Psychophysiology	30-36
AM_470700	Neuroendocrinology	6
AM_470736	Psychophysiology	6

c. Specialization Cardiovascular Diseases

Three specialised courses (18 EC, see below) and a Research Placement including thesis (30-36) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory</i>	
M_CCLINBIO09	Clinical and Biophysical Aspects of Cardiovascular Diseases and Imaging	6
M_CPATHO09	Pathophysiology of Heart and Circulation	6
M_CREMODE09	Remodelling of the Circulatory System	6
M_CVASCFO09	Vascular Function and Metabolic Diseases	6
AM_471136	Internship Cardiovascular Diseases	30-36

d. Specialization Infectious diseases

Three specialised courses (18 EC, see below) and a Research Placement including thesis (30) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory courses</i>	
AM_471138	Internship Infectious Diseases	30-36
AM_470657	Molecular Infection Biology	6
AM_470656	Advanced Molecular Immunology and Cell Biology	6
	<i>Elective options (compulsory to choose at least 6 EC)</i>	
AM_470127	Containment Strategies of Infectious Diseases	6
AM_470094	Health Geography	6
AM_470052	Parasitology	6
M_OVIRON C03	Viral Oncogenesis	3

e. Specialization International Public Health

Three specialised courses (18 EC, see below) and a Research Placement including thesis (30) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory courses</i>	
AM_470127	Containment Strategies for Infectious Diseases	6
AM_471139	Internship International Public Health	30-36
AM_470819	Policy, Management and Organisation in IPH	6
AM_470817	Research Methods for Needs Assessments	6
	<i>Optional courses</i>	
AM_470588	Disability and Development	6
AM_470818	Health, Globalisation and Human Rights	6
AM_470820	International Comparative Analyses of Health Care Systems	6

f. Specialization Medical and Behavioral Genomics

Three specialised courses and a Research Placement including thesis (30) are compulsory. The course programme consists of the following components, with the study load for each component given in EC.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_471142	Internship Medical and Behavioral Genomics	30-36
AM_1008	Genomic Data Analysis	6
AM_470729	Gene Hunting	6
AM_470733	Complex Trait Genetics	6
AM_1040	Statistical Genetics for Gene Finding	6

g. Flexible programme

A flexible programme is a research programme of two years comprised of the compulsory components listed under 2.3.1.1. With regard to optional courses, students may fulfil their programme with selected courses from other specialization programmes within the Master's programme in Biomedical Sciences and units defined under 2.3.2. The sequence of the programme is not defined.

2.3.3 Societal Specialization

The programme of the Societal specialization consists of 54 EC. This specialization may not be combined with the Communication specialization, the Education specialization, or a second Societal specialization.

The specialization must be combined with a research programme in biological research, comprising 57 EC (courses, placement and literature study), and with the general compulsory courses (total 9 EC, listed under 2.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Societal specialization is as follows:

Compulsory components		
code	name	EC
AM_471147	Internship Societal Specialization	30-36
AM_470571	Analysis of Governmental Policy	6
AM_470572	Communication, Organisation and Management	6
AM_470582	Qualitative and Quantitative Research Methods	6
Subtotal compulsory components		48-54
Optional components		
code	name	EC
AM_470584	Business Management in Health and Life Sciences	6
AM_470585	Clinical Development and Clinical Trials	6
AM_470588	Disability and Health Development	6
AM_470575	Entrepreneurship in Health and Life Sciences	6
AM_470818	Health, Globalisation and Human Rights	6
AM_470589	Policy, Politics and Participation	6
AM_1002	Science in Dialogue	6
Total EC specialization		54*

* see 2.3.1.2

2.3.4 Communication specialization

The programme of the Communication specialization consists of 54 EC. This specialization may not be combined with the Societal specialization, the Education specialization, or a second Communication specialization.

The specialization must be combined with a research programme in biological research, comprising 57 EC (courses, Placement and literature study), and with the general compulsory courses (total 9 EC, listed under 2.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Communication specialization is as follows:

Compulsory components		
code	name	EC
AM_471148	Internship Communication Specialization	30-36
AM_470587	Science and Communication	6
AM_470582	Qualitative and Quantitative Research Methods	6
Elective components		
code	name	EC
AM_471014	Science Journalism	6
AM_470572	Communication, Organisation and Management	6
AM_1002	Science in Dialogue	6

AM_470590	Science Museology	6
Total EC specialization		54*

* see 2.3.1.2

2.3.5 Education specialization

The programme of the Education specialization consists of 60 EC. This specialization may not be combined with the Societal specialization or the Communication specialization.

The specialization must be combined with a research programme in biomedical research, comprising at least 51 EC (courses, Student Placement and literature study) and with the general compulsory courses (total 9 EC, listed under 2.3.1.1) to meet the general requirements of the Master's programme.

The programme of the Education specialization is as follows:

The Master's programme 'Education' is made up of:

Education content* (60 EC)		
code	name	EC
O_MLADEPI	Algemene didactiek en pedagogiek I	6
O_MLADEPII	Algemene didactiek en pedagogiek II	3
O_MLPRAKI	Praktijk I	15
O_MLPRAKII	Praktijk II	15
O_MLVDBII	Vakdidactiek biologie I	3
O_MLVDBIII	Vakdidactiek biologie II	6
O_MLPOOI	Professionele Ontwikkeling en Onderzoek I	3
O_MLPOOII	Professionele Ontwikkeling en Onderzoek II	6
O_MLVERD	Verdieping	3
Total compulsory education components		60

* The course components mentioned under 'Education content' fall under the AER/OER 'Masteropleidingen Leraar Voorbereidend Hoger Onderwijs'. The language of instruction of the Education specialization is Dutch.

2.3.6 Optional components

With regard to optional courses, students may fulfil their programme with selected courses from other specialization programmes within the Master's programme in Biomedical Sciences, as listed under subsection 2.3.2 to 2.3.5. Furthermore students can choose from courses and capita selecta that are listed in the master guide Life Sciences 2013-2014 and have defined Master students in Biomedical Sciences as target audience.

2.4 Deviating from the programme

1. With regard to the capita select, students may also take selected subjects and courses from the Master's programmes in Biology, Biomolecular Sciences, Neurosciences, Oncology and Management, Policy Analysis and Entrepreneurship in the Health and Life Science. In order to broaden their knowledge students may also take selected subjects and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of Research Placement. The student must request this in writing before the end of the Research Placement. The request must be underpinned by reasons related to the work in question.

2.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471145	<i>Non Research programmes</i> Internship Communication Specialization	registration of at least 18 EC of the master programme concerned
AM_471143	Internship Education Specialization	
AM_471147	Internship Societal Specialization	
	<i>Research programmes</i>	
AM_471136	Internship Cardiovascular Diseases	
AM_471137	Internship Immunology	
AM_471138	Internship Infectious Diseases	
AM_471139	Internship International Public Health	
AM_471142	Internship Med. And Behavioural Genomics	
AM_471140	Internship Psychophysiology	
AM_470733	Complex Trait Genetics	AM_470729 Gene Hunting <i>or</i> AM_1040 Statistocal Genetics for Gene Finding

2.6 Admission to the programme

Admission to the master programme Biomedical Sciences

2.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. article 2.6.2 lists all degrees that provide direct admission or are subject to additional requirements.
2.6.2	Direct admission is provided to the Master's programme in Biomedical Sciences for students with a Bachelor of Science degree in Biomedical Sciences from a Dutch university or with a Bachelor of Science degree in Health and Life Sciences with a major in Biomedical Sciences.
2.6.3	Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than listed in article 2.6.2, will not receive direct admission to the programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
2.6.4	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
2.6.5	In all cases other than those specified in paragraphs 1 to 4, the final decision rests with the admission board.

2.7 Cancelled programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2012-20132 part of:	2013-2014
AM_471017	History of Life Sciences	3	Compulsory courses	Final resit
AM_470734	Statistical Genetics for Gene Finding	5	Spec. Medical and Behavioural Genomics	Final resit. Replaced by AM_1040, 6 EC, same name

3 BIOMOLECULAR SCIENCES

3.1 Final attainment levels

A Master's graduate possesses an academic attitude and academic skills. This means that a Master's graduate:

- has knowledge about terminology, state-of-the-art of theory and research topics in the biomolecular sciences disciplines (such as biophysics, biochemistry, and cell biology)
- possesses familiarity with general and specific scientific literature and knows how to analyse, summarize and critically evaluate this information
- has the ability to use the principles from the different disciplines in the design of research plans, the execution of research, and the analysis of the results
- has command of the relevant research techniques and laboratory procedures, including safety procedures and the ability to solve emerging problems
- has command of the use of computer software relevant for the field
- is able to communicate experimental results in a labjournal, written report and oral presentation
- can analyze and evaluate planning, execution and results of research independently and critically
- can collaborate with researchers from the same and other disciplines and can think multidisciplinary
- can contribute to scientific discussions about plans, results and consequences of research
- has insight into the scientific and social relevance of current research in biomolecular sciences and can apply scientific knowledge on issues in society
- can reflect on ethical aspects of research and applications of research
- can evaluate his or her own functioning, both by reflection and in discussions with others

3.2 Specializations in MSc Biomolecular Sciences

The programme contains the following specializations

- a. Molecular Cell Biology
- b. Biological Chemistry

3.3 Composition of the programme

3.3.1 General setup programme

<i>General setup specialization a and b</i>	
<i>name</i>	<i>EC</i>
Short Research Placement *	24-30
Long Research Placement *	30-36
Thesis based on literature study*	9
General compulsory MSc courses	6
Specific compulsory courses*	30
Optional courses or Capita Selecta	15

**depending on the specialization. To qualify for a specialization one Research Placement in the context of the specialization is compulsory in addition to the specific courses. In total the short and long placement should equal 60 EC*

3.3.2 Biological Chemistry

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory courses</i>	
AM_470707	Ethics in Life Sciences	3
AM_471023	Scientific Writing in English	3
AM_471129	Internship I Biological Chemistry	30 or 36
AM_471130	Internship II Biological Chemistry	30 or 36
AM_471153	Thesis Based on Literature Study	9
AM_470614	Genomes and Gene Expression	6
AM_470145	Protein Science	6
	<i>Restricted options (at least 1 is compulsory)</i>	
X_432536	Drug-induced Stress and Signaling (FEW)	6
X_432535	Signal Transduction in Health and Disease (FEW)	6
	<i>Restricted options (at least 6 EC is compulsory)</i>	
X_432542	Biomolecular Screening (FEW)	3
AM_470629	Biophotonics 1: Microspect-roscopy	3
AM_470630	Biophoton-ics 3: Practical training	3
X_435683	Project Computational Design and Synthesis of Drugs	6
X_432540	Molecular Biology Techniques (FEW)	3
X_432541	Molecular Pharmacology (FEW)	3
AM_470641	Protein Science Technique	3
	<i>Optional courses</i>	
X_432539	Business and Innovation in Life Sciences (FEW)	3
AM_1021	Caput Microbial Genomics	3
X_432538	Chemical Biology (FEW)	6
X_422583	Dynamics of Biomolecules and Cells (FEW)	6
X_405019	Structural Bioinformatics (FEW)	6

The Research Placements/internships have to be submitted to the Examination Board for approval.

3.3.3 Molecular Cell Biology

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Compulsory courses</i>	
AM_470707	Ethics in Life Sciences	3
AM_471023	Scientific Writing in English	3
AM_471127	Internship I Molecular Cell Biology	30 or 36
AM_471128	Internship II Molecular Cell Biology	30 or 36
AM_471153	Thesis Based on Literature Study	9
AM_470614	Genomes and Gene Expression	6
AM_470145	Protein Science	6
	<i>Restricted options (at least 1 is compulsory)</i>	
AM_470615	Cell Structures and Functions	6
AM_1020	Evolving Networks	6

	<i>Restricted options (at least 6 EC is compulsory)</i>	
X_432542	Biomolecular Screening (FEW)	3
AM_470629	Biophotonics 1: Microspectroscopy	3
AM_470630	Biophotonics 3: Practical Training	3
X_432540	Molecular Biology Techniques (FEW)	3
X_432541	Molecular Pharmacology (FEW)	3
X_432763	Molecular Photobiology	3
	<i>Optional courses</i>	
X_432539	Business and Innovation in Life Sciences	3
AM_1021	Caput Microbial Genomics	3
AM_470613	Developmental Biology	6
X_422583	Dynamics of Biomolecules and Cells	6
AM_470509	Extreme Biology	6
X_405019	Structural Bioinformatics	6

The Research Placements/internships have to be submitted to the Examination Board for approval.

In addition to the courses listed above, the following optional elements will be offered in 2013-2014:

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Optional Capita Selecta</i>	
AM_470605	Caput Cellular Protein Trafficking	6
AM_470606	Caput Epigenetics	6
AM_470604	Caput Molecular Biotechnology	6
AM_470120	Caput Protein Structure as Molecular Basis of Disease	6
AM_470607	Caput Structural Biology	6
AM_1021	Caput Microbial Genomics	3
X_432764	Caput AIMMS Lectures and Seminars	3

3.4 Deviating from the programme

1. With regard to optional courses, students may also take selected subject and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of Research Placement. The student must request this in writing before the end of the Research Placement. The request must be underpinned by reasons related to the work in question.

3.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471127	Internship I Molecular Cell Biology	registration of at least 18 EC of the master programme concerned
AM_471128	Internship II Molecular Cell Biology	
AM_471129	Internship I Biological Chemistry	
AM_471130	Internship II Biological Chemistry	
AM_471153	Thesis Based on Literature Study	

3.6 Admission to the programme

Admission to the master programme Biomolecular Sciences

3.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Article 3.6.2 lists all degrees that provide direct admission or are subject to additional requirements.
3.6.2	Direct admission to the Master's programme in Biomolecular Sciences is possible with a Bachelor's degree in Biology, Medical Natural Sciences, Pharmaceutical Sciences or Chemistry from VU University Amsterdam.
3.6.3	Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than listed in Article 3.6.2, will not receive direct admission to the programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the Admission Board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
3.6.4	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
3.6.5	In all cases other than those specified in paragraphs 1 to 4, the final decision rests with the admission board.

3.7 Cancelled programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2012-2013 part of:	2013-2014
X_422516	Biophysical Techniques (FEW)	3	Restricted options	
AM_471017	History of Life Sciences	3	Restricted options	Final resit
X_422517	Physical Biology of the Cell I	3	Optional courses of both specializations	
X_422518	Physical Biology of the Cell II	3	Optional courses of both specializations	

4 EARTH SCIENCES

4.1 Final attainment levels

The domain-specific reference framework for Earth Science education has specified general objectives for a master's degree programme in the domain. These are to impart to the students the knowledge, attitudes, skills, and insights that render the graduated master (1) capable of practicing his/her profession independently, or (2) qualified for continuing training in scientific research. Furthermore, the graduate should be competitive in his/her field on the international labour market, both with respect to employment in industry (including consultancy firms) or government bodies, and PhD-research programmes at (inter) national scientific institutions. These objectives have subsequently been translated into final general attainment levels of the Earth Sciences programme in relation to the Dublin descriptors. The final attainment levels are listed in Table 1-1.

Table 1-1. Final attainment levels of the graduated Master in Earth Sciences for all MSc Earth Sciences tracks, in relation to Dublin descriptors.

General

1. The graduate has specific and fundamental theoretical and practical knowledge of Earth science processes, notably within his/her field of specialisation, as a basis for predicting the further course of processes, including the role of mankind now and in the future. The need for 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. The graduate 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. The graduate 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. The graduate recognises 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 realise this.
5. The graduate 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. The graduate 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.

Dublin descriptor 1: Knowledge and insights

The graduate has demonstrated knowledge and insights in a field of study that builds upon and their general secondary 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) and (2) Palaeoclimatology and Geo-Ecosystems and Applied Environmental Geosciences

- 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 land 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.

(1) Palaeoclimatology and Geo-Ecosystems:

profound knowledge of the proxies employed in palaeoclimate and geo-ecosystem research.

(2) Applied Environmental Geosciences:

- substantial knowledge of hydrology and/or Geographical Information Science, Remote Sensing techniques;
- profound knowledge of the methods applied in environmental geosciences.

(3) Earth Sciences and Economics

- 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 the graduate has profound knowledge of:

- climate systems and their interaction to geo-ecological systems, man, policy making and spatial economics.
- the water cycle interacting with the elements of ecosystem functioning, land use, spatial economics and policy.
- energy systems, especially geothermal, its policy and spatial economics.

(4) and (5) Archaeometry and Landscape archaeology

- a thorough knowledge of Geographical Information Science, Remote Sensing techniques;
- a broad and thorough knowledge of the most important categories of inorganic and organic archaeological finds;
- a basic knowledge in biological (biomolecular) archaeometry;
- knowledge of geophysical and geological methods in order to trace archaeological sites and sources of raw materials from the past.

(4) Archaeometry:

- a thorough knowledge of categories of anorganic and organic archaeological finds;
- a thorough knowledge of biological archaeometry (including archaeozoology);
- a thorough knowledge of geochemical processes and analysis techniques;
- a thorough knowledge of hydrology and hydrochemical processes.

(5) Landscape archaeology:

- a thorough knowledge of geobotanics, palaeo-ecology, including palynology and palaeo-ecological environments in order to make landscape reconstructions

independently;

- a thorough knowledge of Dutch landscape types.

(6) Solid Earth

- a regional knowledge of worldwide geological systems and their settings;
- knowledge of relationships between deeper processes (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 competences² typically demonstrated through devising and sustaining arguments and solving problems within their field of study.

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 it. 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 finalisation 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) and (2) Palaeoclimatology and Geo-Ecosystems and Applied Environmental Geosciences

- unravel a sedimentary archive embedding climate and geo-environmental signals, by employing an array of techniques;

- contact affiliated departments to perform certain techniques, not available in our Institute.

(1) Palaeoclimatology and Geo-Ecosystems

- 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.

(2) Applied Environmental Geosciences

- perform geo-scientific environmental analyses and reconstructions.

(3) Earth Sciences and Economics

- 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.

(4) Archaeometry

- recognise and monitor contamination and degradation processes of archaeological materials;
- reconstruct ancient technologies and production processes and to understand trade patterns and the use of raw materials in general;
- apply the knowledge of the role that preservation of the archaeological cultural heritage plays in the political debate;
- apply the knowledge of the current archaeological polity concerning research and in-situ preservation of the archaeological cultural heritage;
- work with the methods of current Dutch contract archaeology.

(5) Landscape archaeology

- independently apply palaeo-ecological and geological methods and techniques for landscape reconstructions;
- interpret the current Dutch landscape in terms of geological and geomorphological processes, environments and landforms;
- interpret reconstructions of landscape and environment in terms of possibilities for settlement- and use for Prehistorical humans;
- use geological and palaeo-ecological data in order to understand processes of degradation, threats and in-situ preservation of the archaeological heritage;
- interpret and apply results of geophysical and geochemical surveying techniques.

(6) Solid Earth

- apply fieldwork skills, i.e. linking theoretical knowledge and factual information to real sight observations, such as three dimensional scenes of geological structures on outcrop scale or in landscape view;
- apply analogue and/or numerical modelling techniques associated with the subject of specialisation.

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 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 specialisation'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 specialisations 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.

4.2 Specializations in MSc Earth Sciences

The following specializations exist within the Master Earth Sciences:

I	Research specializations
	a. Applied Environmental Geosciences
	b. Archaeometry (valid until 31-08-2014)
	c. Earth Sciences and Economics
	d. Landscape Archaeology (valid until 31-08-2014)
	e. Solid Earth
	f. Palaeoclimatology and Geo-Ecosystems
II	Education specialization
III	Science communication specialization

4.3 Composition of the programme

Paragraph 4.3.1 to 4.3.3 reflect the compulsory part of the various master programmes. In paragraph 4.3.4 the scope for optional components is represented.

4.3.1 Research Specializations

a. Applied Environmental Geosciences

The specialization 'Applied Environmental Geosciences' is made up of 84 EC of compulsory components, as described below; and 36 EC of optional components as described in Article 4.3.4.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450185	Modern Climate Systems	3
AM_450313	Modern Geo-ecosystems	3
AM_450330	Sedimentary Environments and Climates Archives	6
AM_450146	From Source to Sink; Chemical and Physical Cycles	6
AM_450331	High Resolution Archives	6
AM_450266	Practical Paleoclimate Change and Environmental Impacts	3
AM_450226	Basics in Geographical Information Systems	3
AM_450267	Research Project Applied Environmental Geosciences	24
AM_450268	Master Thesis Applied Environmental Geosciences	27
AM_450354	Scotland Excursion	3
	Total compulsory components	84

b. Archaeometry

As of academic year 2013-2014 the master's specialization Archaeometry is no longer offered by our faculty.

Students who started the programme in academic year 2012-2013 or before, are eligible to sit the examination leading to the title of Master of Science in Earth Sciences, Specialization Archaeometry.

After 31-08-2014 these students can only sit an examination leading to the title of Master of Science in Earth Sciences (Flexible degree programme, see Section 1 General provisions, article 3.2).

The specialization 'Archaeometry' is made up of 88 EC of compulsory components, as described below; and 32 EC of optional components, as described in Article 4.3.4.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450291	Biological Archaeometry	6
AM_450294	Capita Selecta Geoarchaeology	3
AM_450191	International Masterclass Geoarchaeology	10
AM_450226	Basics in Geographical Information Systems	3
AM_450172	Advanced Inorganic Geochemistry	3
AM_450289	Archaeometry III	6
AM_450296	Research Project Archaeometry	27
AM_450227	Applied Geographical Information Systems	3
AM_450300	Master Thesis Archaeometry	27
Total compulsory components		88

c. Earth Sciences and Economics

The specialization 'Earth Sciences and Economics' is made up of 81 EC of compulsory components, as described below; and 39 EC of optional components.

Compulsory components

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450400	Microeconomic Foundation for Spatial Policy	6
AM_450401	Empirical Methods for Spatial Policy	6
AM_450402	Decision Making Processes	6
AM_450403	Imaging the Earth Surface	3
AM_450404	Assessing the Landscape	3
AM_450405	Exploring Earth Processes and Resources	6
AM_450406	Project Environmental Impact Assessment	6
AM_450407	Master Thesis Earth Sciences and Economics	27
AM_1103	Research Project Earth Sciences and Economics*	18
Total compulsory components for all themes		81

- The research project can be extended by 12 EC.

Restricted options Earth Sciences and Economics

Students should select at least 12 EC of earth science oriented course components, and at least 6 EC of economics oriented course components.

<i>code</i>	<i>name</i>	<i>EC</i>	<i>Orientation</i>
AM_450137	Aquatic Ecology	6	Earth Sciences
AM_450188	Climate and Policy	6	Economics
AM_450014	Ecohydrology	6	Earth Sciences
E_STR_EEC	Environmental Economics	6	Economics
E_STR_EEC	Environmental Economics	6	Economics
AM_468018	Energy Technology Assessment	6	Economics
AM_468019	Energy Systems Transitions	6	Earth Sciences
AM_450409	Geothermal Energy	6	Earth Sciences

E_STR_IEE	International Environmental Economics	6	Economics
AM_450187	Man and Climate: From Hominids to Modern Civilisation	3	Earth Sciences
AM_450185	Modern Climate Systems	3	Earth Sciences
AM_450313	Modern Geo-ecosystems	3	Earth Sciences
AM_450408	Petroleum Systems	6	Earth Sciences
AM_450170	Reflection Seismics	6	Earth Sciences
E_STR_RUE	Regional and Urban Economics	6	Economics
AM_450330	Sedimentary Environments and Climate Archive	6	Earth Sciences
AM_1030	Soil and Environment	6	Earth Sciences
AM_470502	Spatial Ecology and Global Change (offered in 2013-2014)	6	Earth Sciences
E_STRTREC	Transport Economics	6	Economics
AM_468023	Water and Policy	6	Economics

d. Landscape Archaeology

As of academic year 2013-2014 the specialization Landscape Archaeology is no longer offered by our faculty. Students who started the programme in academic year 2012-2013 or before, are eligible to sit the examination leading to the title of Master of Science in Earth Sciences, Specialization Landscape Archaeology.

After 31-08-2014 these students can only sit an examination leading to the title of Master of Science in Earth Sciences (Flexible degree programme, see Section 1 General provisions, article 3.2).

The specialization 'Landscape Archaeology' is made up of 88 EC of compulsory components, as described below; and 32 EC of optional components, as described in Article 4.3.4.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450292	Historical Geography	6
AM_450291	Biological Archaeometry	6
AM_450294	Capita Selecta Geoarchaeology	3
AM_450054	Palaeo-ecology/Palynology	3
AM_450191	International Masterclass Geoarchaeology	10
AM_450226	Basics in Geographical Information Systems	3
AM_450227	Applied Geographical Information Systems	3
AM_450295	Research Project Landscape Archaeology	27
AM_450298	Master Thesis Landscape Archaeology	27
	Total compulsory components	88

e. Solid Earth

The specialization 'Solid Earth' is made up of 81 EC of compulsory components, as described below; and 39 EC of optional components as described in Article 4.3.4.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450229	Introduction Field Excursion	3
AM_450225	Mantle Properties in Lithosphere Development	3
AM_450179	Petroleum Systems and Regional Geology	3
AM_450146	From Source to Sink; Chemical and Physical Cycles	6
AM_450154	Sedimentary Basins	6
AM_450190	Orogenesis	6
AM_450200	Research Project Solid Earth	27
AM_450199	Master Thesis Solid Earth	27
	Total compulsory components	81

f. Palaeoclimatology and Geo-ecosystems

The specialization Palaeoclimatology and Geo-ecosystems¹ is made up of 102 EC of compulsory components, as described below; and 18 EC of optional components, as described in Articles 4.3.4.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450188	Climate and Policy	6
AM_450004	Climate Modelling	6
AM_450146	From Source to Sink: Chemical and Physical Cycles	6
AM_450332	Global Biogeochemical Cycles	6
AM_450331	High Resolution Archives	6
AM_450187	Man and Climate: From Hominids to Modern Civilisation	3
AM_450185	Modern Climate Systems	3
AM_450313	Modern Geo-ecosystems	3
AM_450266	Practical Paleoclimate Change and Environmental Impacts	3
AM_450202	Research Project Palaeoclimate and Geo-ecosystems	27
AM_450354	Scotland Excursion	3
AM_450330	Sedimentary Environments and Climate Archives	6
AM_450201	Master Thesis Palaeoclimate and Geo-ecosystems	24
	Total compulsory components	102

4.3.2 Education

The specialization 'Education' is made up of:

Earth sciences content (60 EC)		
AM_450 var	Research Project from one of the Master's programmes	24 / 27
AM_1051	Sociale Geografie II	12
	Compulsory courses chosen from the obligatory courses of the same masterprogramme as the research project chosen	12
	Total elective Earth Sciences components (see 4.3.4 and 4.3.5)	9-12
Education content (60 EC)*		
<i>code</i>	<i>name</i>	<i>EC</i>
O_MLADEPI	Algemene didactiek en pedagogiek I	6
O_MLADEPII	Algemene didactiek en pedagogiek II	3
O_MLPRAKI	Praktijk I	15
O_MLPRAKII	Praktijk II	15
O_MLVDAKI	Vakdidactiek aardrijkskunde I	3
O_MLVDAKII	Vakdidactiek aardrijkskunde II	6
O_MLPOOI	Professionele Ontwikkeling en Onderzoek I	3
O_MLPOOII	Professionele Ontwikkeling en Onderzoek II	6
O_MLVERD	Verdieping	3
	Total compulsory education components	60

* The course components mentioned under 'Education content' fall under the AER/OER 'Masteropleidingen Leraar Voorbereidend Hoger Onderwijs'. The language of instruction of the Education specialization is Dutch.

4.3.3 Science Communication

The Master's programme 'Science Communication' is made up of:

Earth Sciences content (60 EC)		
<i>code</i>	<i>name</i>	<i>EC</i>
	Choose one of the following course modules	
AM_450var	Research Project from one of the Master's	
	Compulsory courses chosen from the obligatory courses of the same masterprogramme as the research project chosen	12
	Total elective Earth Sciences components (see 4.3.4 and 4.3.5)	21-24
Science Communication content (60 EC)		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_470587	Science and Communication	6
AM_470582	Qualitative and Quantitative Research Methods	6
47 var	Thesis	9
47 var	Research Project	21
	Total EC compulsory components	42
AM_470572	Communication, organization and management	6
AM_470590	Science Museology	6
AM_1002	Science in Dialogue	6
AM_471014	Science Journalism	6
	Total EC optional components to select	18

4.3.4 Optional components

1. The scope for optional components involves opting for components of the Master's programme not yet taken. The optional components are listed below.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450171	Advanced Geochronology	3
AM_450293	Advanced Geophysical Prospection	3
AM_450172	Advanced Inorganic Geochemistry	3
AM_450227	Applied Geographical Information Systems	3
AM_450403	Assessing the Landscape	3
AM_450137	Aquatic Ecology	3
AM_450226	Basics in Geographical Information Systems	3
AM_450175	Building Tectonic Models	6
AM_450144	Capita Selecta Structural Geology and Tectonics	3
AM_450003	Catchment Response Analysis	6
AM_450004	Climate Modelling	6
AM_450188	Climate and Policy	6
AM_450133	Contaminant Hydrogeology	3
AM_450169	Diagenesis of Sedimentary Rocks	3
AM_450014	Ecohydrology	6
AM_450145	Environmental Remote Sensing	6
AB_450405	Exploring Earth Processes and Resources	6
AM_470055	Evolutie van de mens	6
AM_450126	Field Course Netherlands	6
AM_450409	Geothermal Energy	6
AM_450332	Global Biogeochemical Cycles	6
AM_450009	Groundwater Hydraulics	6
AM_450132	Groundwater Microbiology and Geochemistry (Geomicrobiology)	6
AM_450292	Historical Geography	6
AM_1012	Hydrological Systems and Water Management	6
AM_450052	Hydrochemistry	6
AM_450403	Imaging the Earth Surface	3
AM_450148	Isotope Hydrology	3
AM_450180	Low Temperature Deformations of Rocks and Regions	3
AM_450187	Man and Climate	3
AM_450189	Magmatic Processes	6
AM_450167	Magmatic Processes Capita Selecta (melt inclusions)	3
AM_450176	Metamorphism and P-T Evolution	6
AM_450158	Microstructures in Tectonites	6
AM_450185	Modern Climate Systems	3
AM_450313	Modern Geo-ecosystems	3
AM_450054	Palaeo-ecology/Palynology	3
AM_450164	Precambrian Geology	3
AM_450170	Reflection Seismics	6
AM_470587	Science and communication	6
AM_471014	Science Journalism	6
AM_450330	Sediment Environment and Climate Archives	6
AM_450058	Sediment Petrography of Heavy Minerals	3
AM_1051	Sociale geografie II	12
AM_1030	Soil and Environment	6
AM_1049	Causes and Consequences of Environmental Change	6
AM_1015	Sustainable Land Management	6
AM_470045	Toegepaste ecologie	6
AM_450131	Transport Processes in Groundwater	6
AM_450061	Volcanism	3

- The scope for optional components can be fulfilled within the Master Earth Sciences by extending the Master's thesis requirement which exists within the various Master's programmes by 12 EC.

4.3.5 Additional optional components for the master specializations Education and Science Communication

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450402	Decision Making Processes	6
AM_450403	Imaging the Earth Surface	3
AM_450404	Assessing the Landscape	3
AM_450405	Exploring Earth Processes and Resources	6
AM_468023	Water and Policy	6
AM_1030	Soil and Environment	6
AM_450408	Petroleum Systems	6
AM_468018	Sustainable Energy Analyses	6

4.4 Deviating from the programme

- As an alternative, the optional component may also be partly or completely fulfilled by taking components from other university Master's programmes. This alternative requires the prior permission of the Examination Board. Before granting permission, the Examination Board will evaluate the content and cohesion of the programme.
- A *VU University Amsterdam* programme component can be replaced with another component taught at any other institution of academic education, inside or outside the Netherlands, provided that the alternative component's contents and study load are comparable, and only after prior permission of the Examination Board.

4.5 Sequence of examinations

- Participation in the components listed below is only possible if the admission requirements have been met.

<i>code</i>	<i>subject</i>	<i>entry requirements</i>
AM_450268	Master Thesis Applied Environmental Geosciences	registration of at least 36 EC of the specialization concerned
AM_450300	Master Thesis Archaeometry	registration of at least 36 EC of the specialization concerned
AM_450407	Master Thesis Earth Sciences and Economics	registration of at least 36 EC of the specialization concerned
AM_450298	Master Thesis Landscape Archaeology	registration of at least 36 EC of the specialization concerned
AM_450201	Master Thesis Palaeoclimate and Geo-ecosystems	registration of at least 36 EC of the specialization concerned
AM_450199	Master Thesis Solid Earth	registration of at least 36 EC of the specialization concerned

AM_1103	Research Project Earth Sciences and Economics	registration of at least 18 EC of the specializationconcerned
AM_450202	Research Project Palaeoclimatology	registration of at least 18 EC of the specializationconcerned
AM_450296	Research Project Archaeometry	registration of at least 18 EC of the specializationconcerned
AM_450295	Research Project Landscape Archaeology	registration of at least 18 EC of the specializationconcerned
AM_450267	Research Project Applied Environmental Geosciences	registration of at least 18 EC of the specializationconcerned
AM_450200	Research Project Solid Earth	registration of at least 18 EC of the specializationconcerned

2. On the grounds of a motivated request by the student, the Examination Board may grant an exemption to the condition stipulated in Article 4.5.1 of these Academic and Examination Regulations.

4.6 Admission to the programme

Admission to the master programmes in Earth Sciences

4.6.1 Students with a Bachelor of Science degree in Earth Sciences from the <i>VU University Amsterdam</i> will receive direct admission to the Master Earth Sciences. The additional admission requirements detailed below apply to the specialization within the Master Earth Sciences, as listed in Appendix 4.2	
(a)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (specialization/afstudeerrichting Solid Earth) will receive direct admission to the following specialisations within the Master Earth Sciences: <ul style="list-style-type: none"> - Solid Earth - Applied Environmental Geosciences - Science Communication (C variant) - Education (E variant).
(b)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (specialization/afstudeerrichting Earth Surface) will receive direct admission to the following specializations within the Master Earth Sciences: <ul style="list-style-type: none"> - Applied Environmental Geosciences - Science communication (C variant) - Education (E variant).
(c)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (Geoarchaeology variant) will receive direct admission to the following specializatio within the Master Earth Sciences: <ul style="list-style-type: none"> - Applied Environmental Geosciences - Science communication (C variant) - Education (E variant).
(d)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences will receive direct admission to the specialization <i>Palaeoclimatology and Geoecosystems</i> within the Master Earth Sciences, provided that the bachelor courses Geomorphology (AB_450095) or Terrestrial Environments (AB_450097) and Palaeoclimatology and Meteorology (AB_450240) have been successfully completed:
(e)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie') will receive direct admission to the

	specialization <i>Earth Sciences and Economics</i> within the Master Earth Sciences, when they have completed the bachelor subject <i>Methoden en Technieken voor economisch onderzoek</i> :
(f)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie'), including the minor Earth Sciences ('Aardwetenschappen') will receive direct admission to the specialization <i>Applied Environmental Geosciences</i> within the Master Earth Sciences:
(g)	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie'), including the component <i>'Sociale geografie I' (AB_450099)</i> , will receive direct admission to the specialization <i>Education (E-variant)</i> within the Master Earth Sciences.
(h)	Students who do not receive direct admission to a given Master's programme 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.
4.6.2	Students who hold a Bachelor's degree in Earth Sciences from a Dutch university other than the <i>VU University Amsterdam</i> may be admitted to the Master Earth Sciences at the <i>VU University Amsterdam</i> 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.
4.6.3	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 the <i>VU University Amsterdam</i> 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.
4.6.4	Students who hold a certificate of higher vocational education (HBO) may be admitted to the Master Earth Sciences at the <i>VU University Amsterdam</i> 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.
4.6.5	Students who hold an equivalent qualification from an institution outside of the Netherlands may be admitted to the Master Earth Sciences at the <i>VU University Amsterdam</i> 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.

4.7 Cancelled programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2011-2012 part of:	2013-2014
AB_450185	Bodem en milieu	6	Specialization Earth Sciences and Economics	Replaced by 'AM_1030 Soil and Environment
AM_450297	Master Thesis Landscape Archaeology; public domain/industry traineeship (M-variant)	27	Specialization Landscape Archaeology	Replaced by AM_450298 Master Thesis Landscape Archaeology
AM_450299	Master Thesis Archaeometry; public domain/industry traineeship (M-variant).	27	Specialization Archaeometry	Replaced by AM_450300 Master Thesis Landscape Archaeometry
AM_468011	Sustainability and Growth	6	Optional components	Replaced by AM_1049 Causes and Consequences of Environmental Change (6 EC)

5 ECOLOGY

5.1 Final attainment levels

Final attainment levels of the Master's Ecology, according to the Dublin descriptors:

Dublin descriptor 1

Knowledge and understanding: The graduate should have specialized theoretical and practical knowledge of Ecological Science notably within the field of his/her specialization.

The graduate:

- masters of the field's conceptual framework, understands the state of the art in terms of developing theories and has insight into the most important current research issues in the ecological discipline in which he/she has specialized.
- appreciates the place of this sub-discipline within the Biology, the Natural Sciences and society.
- is able to appreciate the scientific and social relevance of ecology, and of current research in this area.
- is able to think in multidisciplinary terms, and possesses an understanding of other disciplines (and sub-disciplines) that are of importance to ecology.
- has sufficient knowledge of and is able to apply mathematical and statistical methods.
- has command of advanced research techniques and laboratory procedures.

Dublin descriptor 2

Application of knowledge: The graduate should be experienced in carrying out research, in applying techniques specific to the subject area and in applying scientific knowledge to problems raised in society.

The graduate:

- is able to design experiments in the different fields associated with ecology and analyze their results.
- has the ability to use the principles from both molecular and field scale disciplines to tackle ecological problems.
- is able to apply his/her scientific, ecological knowledge to social questions.
- is able to contribute to knowledge transfer to policy and nature management.
- is able to reflect on the ethical aspects of research and its uses, and include these deliberations in the decision-making process.

Dublin descriptor 3

Critical judgment: The graduate should be able to independently and critically judge information.

The graduate:

- is able to independently acquire, analyze and critically evaluate information in an ecological/biological field.
- is able to select and order information, to distinguish essentials from trivialities, and to make associations.
- is able to independently and critically analyze ecological and environmental research, both in relation to its design and performance, and to the results obtained.
- c has the ability to evaluate his/her own performance, both introspectively and in discussion with others.

Dublin descriptor 4

Communication: The graduate should be able to transfer knowledge and skill related to his/her subject area to other persons and to adequately reply to questions and problems posed within society.

The graduate:

- can report orally on research results, in English, with support of modern presentation techniques.
- can report in written form on research results on the level of peer-reviewed academic journals (in English).
- can make essential contributions to scientific discussions about plans, results and consequences of research.
- can collaborate with researchers from other disciplines.

Dublin descriptor 5

Learning skills: The graduate should develop learning skills that enable him/her further self education and development within the subject area.

The graduate:

- is able to understand and summarize scientific ecological literature.
- is able to draw up a research plan, giving details of experimental design, performance and analysis.
- can set up and perform ecological experiments both in the laboratory and in the field.
- is familiar with general scientific journals such as Nature and Science, and with high impact professional journals in Ecology.
- is familiar with computer software that is relevant to the field.

5.2 Specializations in MSc Ecology

The programme contains two examination programmes:

- a. Ecology and Evolution
- b. Environmental Chemistry and Toxicology

5.3 Composition of the programme

5.3.1 Specialization Ecology and Evolution

The Master's specialization programme 'Ecology and Evolution' consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

<i>name</i>	<i>EC</i>
General compulsory courses	21
Optional courses	12-18
<i>Two research projects including report, 69-75 EC total:</i>	
Research Project Ecology and Evolution I,	30-45
Research Project Ecology and Evolution II	30-45
Literature survey	12

The minor and major Research Placement have to reside in the area of Ecology. Both placements have to be submitted to the Examination Board for approval in advance.

The course programme consists of the following components, with the study load for each component given in EC.

Compulsory modules for students starting in academic year 2013/2014

<i>code</i>	<i>name</i>	<i>EC</i>
AM_1038	Current Trends in Evolution (UvA)	6
AM_470707	Ethics in Life Sciences (VU)	3
AM_470505	Experimental Design and Analysis (VU)	6
AM_1016	Masterclasses in Ecology and Evolution (VU)	3
AM_471023	Scientific Writing in English (VU)	3
	Subtotal compulsory courses	21

<i>code</i>	<i>name</i>	<i>EC</i>
	<i>Research and literature study (all compulsory)</i>	
AM_1100	Research Project Ecology and Evolution I (VU/UvA)	30-45
AM_1114	Research Project Ecology and Evolution II (VU/UvA)	30-45
AM_1101	Literature Survey	12

<i>Optional courses</i>			
<i>code</i>	<i>name</i>	<i>EC</i>	Scheduled for
AM_1019	Evolutionary Dynamics (UvA)	6	Both years
AM_470506	Environmental Genomics and Adaptation (VU)	6	2013-2014
AM_1017	Evolution of Species Interactions (UvA)	6	2014-2015
AM_470511	Microbial Ecology (UvA)	6	2014-2015
AM_470507	Soil-Plant-Animal Interactions (VU)	6	2014-2015
AM_1039	Spatial processes in ecology and evolution	6	2013-2014

5.3.2 Specialization Environmental Chemistry and Toxicology

The two-year specialization programme Environmental Chemistry and Toxicology is worth 120 EC. The programme consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014:

name	EC
General compulsory courses	30
Optional courses	12-18
Two research placements including report, 60-656 EC total:	
Research project Environmental Chemistry and Toxicology I	30
Research project Environmental Chemistry and Toxicology II	30-36
Literature survey	12

The minor and major Research Placement have to reside in the area of Ecology. Both placements have to be submitted to the Examination Board for approval in advance.

The programme components consist of the following elements

Compulsory modules for students starting in the academic year 2013/2014

<i>code</i>	<i>name</i>	<i>EC</i>
AM_471023	Scientific Writing in English	3
AM_470707	Ethics in Life Sciences	3

AM_1032	Environmental Chemistry and Toxicology I	6
AM_1033	Environmental Chemistry and Water Quality	6
AM_470512	Ecotoxicology and Environmental Quality	6
AM_470505	Experimental Design and Analysis	6

Compulsory research projects and literature study

<i>code</i>	<i>name</i>	<i>EC</i>
AM_1101	Literature survey	12
AM_1108	Research Project Environmental Chemistry and Toxicology I	30
AM_1113	Research Project Environmental Chemistry and Toxicology I	30-36

Optional courses

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450137	Aquatic Ecology (offered yearly)	6
AM_470506	Environmental Genomics and Adaptation (offered in uneven years, next: 2013-2014)	6
AM_1016	Masterclasses in Ecology and Evolution (yearly)	3
AM_1039	Spatial Processes in Ecology and Evolution (offered in uneven years, next: 2013-2014)	6
X_435609	Separation Sciences (yearly)	6
X_435062	Molecular Spectroscopy (yearly)	6
X_435604	Mass Spectrometry (yearly)	6
AM-1042	Assessment of Natural and Chemical Hazards (yearly, UvA)	6
AM_1043	Biogeochemical cycles (yearly, UvA)	6
AM_1041	Environmental Measuring Techniques (yearly, UvA)	6

5.4 Deviating from the programme

1.	With regard to optional courses, students may also take selected subjects and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval in advance.
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5.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_1108	Research Project Environmental Chemistry and Toxicology I	registration of at least 18 EC of the master programme concerned
AM_1113	Research Project Environmental Chemistry and Toxicology II	
AM_1100	Research Project Ecology and Evolution I	
AM_1114	Research Project Ecology and Evolution II	

5.6 Admission to the programme

Admission to the master programme Ecology.

5.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Article 5.6.2 lists all degrees that provide direct admission. Article 5.6.3 lists all degrees that are subject to additional requirements.									
5.6.2	Direct admission to the Master's programme in Ecology is granted to students with a Bachelor of Science degree in Biology from a Dutch university.									
5.6.3	<p>Admission under additional requirements</p> <p>Admission to the Master's programme in Ecology is provided to students with a Bachelor's degree in Biomedical Sciences, Health and Life Sciences or Earth Sciences (II), with an examination programme that includes at least the following components, with the study load for each component given in EC:</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 80%;">Minor Evolutionary Biology and Ecology</td> <td style="width: 10%; text-align: right;">30</td> </tr> <tr> <td>470203</td> <td>Kust en mariene ecosystemen (Coast and Marine Ecosystems)</td> <td style="text-align: right;">12</td> </tr> <tr> <td>470951</td> <td>Evolutionaire Ecologie en Gedrag, premaster (Evolutionary Ecology and Behaviour)</td> <td style="text-align: right;">3</td> </tr> </table> <p>In addition to a Bachelor's degree in Biology (or equivalent) students from countries outside the EU have to meet the following entrance requirements:</p> <ul style="list-style-type: none"> • Average grades for classes on genetical, ecological, evolutionary and statistical subjects should be within the top 30%. (i.e. 7 or higher for Dutch grades, 14 or higher in the French system, B or A for USA or UK grades and , 2 or 1 for German grades). • The period between the obtaining of the Bachelor's degree and the start of the master's programme in Ecology should not be longer than 5 years, unless, according to the Admission Board the applicant has been able to maintain and update his/her knowledge sufficiently by taking additional courses or by working in the field. <p>The decision for admission will be made based on the evaluation of these requirements in combination with a judgment of the scientific quality of the bachelor's programme of the applicant.</p> <p>In all cases, the final decision rests with the admission board.</p>		Minor Evolutionary Biology and Ecology	30	470203	Kust en mariene ecosystemen (Coast and Marine Ecosystems)	12	470951	Evolutionaire Ecologie en Gedrag, premaster (Evolutionary Ecology and Behaviour)	3
	Minor Evolutionary Biology and Ecology	30								
470203	Kust en mariene ecosystemen (Coast and Marine Ecosystems)	12								
470951	Evolutionaire Ecologie en Gedrag, premaster (Evolutionary Ecology and Behaviour)	3								
5.6.4	Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than listed in 5.5.2, will not receive direct admission to the programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.									
5.6.5	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.									
5.6.6	In all cases other than those specified in Paragraphs 1 to 5, the final decision rests with the admission board.									

5.7 Cancelled programme components

The following programme components are no longer part of the master programme starting in September 2013.

code	titel	EC	In 2012-2013 part of	2013-2014
AM_470502	Spatial Ecology and Global Change	6	Specialization Ecology and Evolution	Replaced by: AM_1039 Spatial Processes in Ecology and Evolution (6 EC)

6 ENVIRONMENT AND RESOURCE MANAGEMENT (ERM)

6.1 Final attainment levels

The final attainment levels described below closely follow the 'Dublin descriptors'. These are student qualifications included in a quality assurance framework for higher education that is being formulated within the European Union.

The student that has graduated in Environment and Resource Management has attained the following knowledge and skills:

Knowledge and understanding

General

- Has demonstrated knowledge and understanding that is founded upon and extends or enhances the level that is typically associated with Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context.

Specific

- Can understand the concept of sustainable development and can elaborate its principles in scientific, technological and socio-economic terms;
- Is able to understand, and to apply in multidisciplinary teams, a range of relevant practical tools for investigating and assessing environmental problems, in particular impact assessment, life cycle analysis, (economic) valuation and policy evaluation, and is aware of the value and the scope of these tools;
- Can apply and interpret the scientific principles and guiding regulations for environmental management, notably in the field of his/her specialization;
- Can recommend practices for environmental management;
- Has an overview of policy instruments and institutional arrangements for managing environmental problems; and
- Is able to judge how well certain policy instruments and institutional arrangements perform in terms of effectiveness, efficiency and the distribution of welfare in society.

Applying knowledge and understanding

General

- Can apply his/her knowledge, understanding and problem solving abilities in new or unfamiliar environments within broader or multidisciplinary contexts related to his/her field of study; has the ability to integrate knowledge and handle complexity.

Specific

- Is able to formulate a problem based on empirical data or literature study and design a scientific approach for researching and investigating the problem;
- Can formulate a research workplan, which includes the problem formulation, the hypotheses or research questions, the proposed execution including methodology, the planning and the envisaged products of the project;
- Is able to independently acquire and compile relevant information on current environmental problems, by doing literature research, modelling and empirical research;
- Can deal with environmental issues in co-operation with other experts;
- Can write environmental (policy) reports and critically evaluate such reports.

Making judgements

General

- Can formulate judgements based on incomplete or limited information, that include reflection on social and ethical responsibilities linked to the application of their knowledge and judgements.

Specific

- Can understand professional literature and academic journal articles and judge their quality and usefulness for own research;
- Can determine independently which data or methods are required to obtain a specific result or to finish a project;
- Understand the subject area's limits, i.e. realise when other expertise should be brought in;
- Can recognise and acknowledge the different perspectives of relevant stakeholders on society and the environment;
- Can argue which solutions are appropriate for environmental problems, based on the information available (including the uncertainties involved);
- Understands his/her personal strong and weak points, affinities, development potential and preferences in relation to the specialisationspecialization chosen;
- Can consciously decide whether he/she prefers to continue studies for obtaining a PhD or take up a position outside the academic world.

Communication

General

- Can communicate conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously.

Specific

- Can complete a report that meets academic standards;
- Can communicate effectively (in writing and orally) with professionals, industry managers and employees, community groups, and the media;
- Can read (scientific) publications in English;
- Can contribute to academic and professional forums;
- Can actively and constructively participate in discussions, debates, negotiations, workshops and meetings;
- Can operate individually and in multidisciplinary groups at a level that is at the frontier of research in Environment and Resource Management;
- Can inform society on (potential) environmental problems, and on the uncertainties concerned.

Learning skills

General

- Has the learning skills to continue to study in a manner that may be largely self-directed or autonomous.

Specific

- Can distinguish truth from convention;
- Can explore, investigate, analyse environmental problems (i.e. have a scientific attitude driven by curiosity);
- Has enough knowledge of relevant disciplines to assess the contribution of each individual discipline;
- Use modern techniques to maintain up-to-date knowledge;
- Read and understand scientific journals and policy reports about environment and resource management;
- Can adjust to new working environments and new views and cultural norms.

6.2 Specializations in MSc ERM

The following specializations exist within the Master's programme in Environment and Resource Management:

- Climate and Water
- Ecosystems Services and Biodiversity
- Energy Studies
- Environmental Studies

6.3 Composition of the programme

6.3.1 The Master's specializations (a) 'Climate and Water Policy', (b) 'Ecosystems Services and Biodiversity', (c) 'Energy Studies' and (d) 'Environmental Studies' are made up of 60 EC of compulsory components. The four specializations share a compulsory programme worth 48 EC.

6.3.2 The compulsory components (48 EC) of the four Master's specializations are:

<i>code</i>	<i>name</i>	<i>EC</i>
AM_468012	Environmental and Energy Policy Tools	12
AM_468020	Environmental Economics	6
AM_468021	Environmental Policy	6
AM_468017	Research Project	18
AM_1049	Causes and Consequences of Environmental Change	6
Supplemented by two compulsory components (12 EC) of the Master's specialization ' Climate and Water '		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_450188	Climate and Policy	6
AM_468023	Water and Policy	6
Or supplemented by two compulsory components (12 EC) of the Master's specialization ' Ecosystems Services and Biodiversity ':		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_468025	Governance of Ecosystems Services	6
AM_468024	Value of Ecosystems Services	6
Or supplemented by two compulsory components (12 EC) of the Master's specialization ' Energy Studies ':		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_468019	Energy Systems Transitions	6
AM_468018	Sustainable Energy Analysis	6
Or supplemented by components (12 EC) of the Master's specialization ' Environmental Studies ': At least one of the following modules is compulsory for this specialization (choose at least one)		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_450188	Climate and Policy	6
AM_468019	Energy System Transitions	6
AM_468025	Governance of Ecosystems Services	6
AM_1029	International Development Issues in the Context of Sustainable Development	6
AM_468018	Sustainable Energy Analysis	6
AM_1015	Sustainable Land Management	6
AM_468024	Value of Ecosystems Services	6
AM_468023	Water and Policy	6

Other elective components FALW (choose at most one of these components)

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450137	Aquatic Ecology	6
AM_450004	Climate Modeling	6
AM_1029	International Development Issues in the Context of Sustainable Development	6
AM_450185	Modern Climate Systems	3
AM_450313	Modern Geo-ecosystems	3
AM_450330	Sedimentary Environments and Climate Archives	6

Students who opt for the specialization Environmental Studies should note that the study load of the elective components differ. Students should take at least 12 EC of the modules listed above.

Other elective components FSW (choose at most one of these components)

<i>code</i>	<i>name</i>	<i>EC</i>
S_TACEP	Theories and Approaches in Comparative European Politics	6
S_TAIR	Theories and Approaches of International Relations	6
S_PPRRPD	Political and Policy Research Philosophy and Design	6

FSW course components may require special permission.

6.4 Sequence of examinations

1. Participation in the components listed below is only possible if the admission requirements have been met.

Participation in the components of the programmes Environment and Resource Management listed below is only possible if the following admission requirements are met:

<i>code</i>	<i>subject</i>	<i>entry requirements</i>
AM_468017	Research project	Students must have obtained a minimum of 18 EC in the ERM programme by the 15th of February, 2014, and must have participated in the team work assignment of the course Environmental and Energy Policy Tools (AM_468012)

6.5 Admission to the programme

Admission to the master programme ERM.

- 6.5.1 Students who hold a Bachelor's degree from the VU University Amsterdam and any other Dutch university other than the VU University Amsterdam or an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the Master's programme in Environment and Resource Management at the VU University Amsterdam on the basis of a decision to that effect taken by the examination board of the Master's programme on a case by case basis. The admission board will determine whether the foreign qualification in question is sufficiently relevant to warrant admission to the Master's programme in Environment and Resource Management. The admission board may make additional demands of the student before granting admission to the Master's programme.
- 6.5.2 Students with a Bachelor of Science degree in *Earth Sciences and Economics* from the *VU University Amsterdam* will receive direct admission to the Master's programme in

Environment and Resource Management at the VU University Amsterdam. However, these students have to send in their documentation via the admission board as well.

- 6.5.3 Students who hold a certificate of higher vocational education (HBO or *Hogeschool*) may be admitted to the Master's programme in Environment and Resource Management at the VU University Amsterdam on the basis of a decision to that effect taken by the admission board of the Master's programme on a case by case basis. The admission board will determine whether the higher vocational (HBO) programme completed by the candidate is sufficiently relevant to warrant admission to the pre-Master's programme in Environment and Resource Management. The admission board may make additional demands of the student before granting admission to the Master's programme.

6.6 Cancelled programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2012-2013 part of:	2013-2014
AM_468011	Sustainability and Growth	6	General programme	Replaced by AM_1049 Causes and Consequences of Environmental Change (6 EC)
AM_468026	Workshop Governance	7	Specialization Environmental Sciences, elective components	No final resit

7 GEOSCIENCES OF BASINS AND LITHOSPHERE

7.1 Final attainment levels

Final attainment levels of the Master Geosciences of Basins and Lithosphere	
Knowledge and insights	
Dublin descriptors	Final attainment levels
<p>The graduate should have specialised theoretical and practical knowledge of the Earth Sciences notably within the field of his/her specialization.</p>	<p>The graduate should have:</p> <ul style="list-style-type: none"> • a regional knowledge of world wide basins and their settings; • knowledge of models for basin formation and evolution, on the basis of intra-basin sedimentary sequences and deformation associated with deeper processes; • knowledge of processes of heat transport and fluid flow, surface processes, and regional scale lithosphere deformation. • knowledge of interpretation techniques of subsurface geophysical and geological data; • knowledge of thermochronological methods and their applications.
Application of knowledge and insight	
Dublin descriptor	Final attainment levels
<p>The graduate should be experienced in carrying out research.</p> <p>The graduate should be able to apply certain techniques, specific to the subject area,</p> <p>The graduate should be able to apply scientific knowledge to problems raised in society.</p>	<p>The graduate is able to:</p> <ul style="list-style-type: none"> • formulate a problem based on raw data and/or data from a literature study and design a scientific approach for researching and solving the problem; • formulate a research proposal, which includes the problem formulation, the hypotheses, the proposed execution, and the finalisation of the project; • develop models suited for the testing of hypotheses and to give explanations; • collect and to critically compile the literature significant to a specific topic to be studied; • apply fieldwork skills, i.e. linking theoretical knowledge and factual information to real sight observations, such as three dimensional scenes of geological structures on outcrop scale or in landscape view; • apply analogue and/or numerical modelling techniques associated with the subject of specialization.
Critical judgement	
Dublin descriptor	Final attainment levels
<p>The graduate should be able to independently and critically judge information.</p>	<p>The graduate should:</p> <ul style="list-style-type: none"> • understand professional literature and to judge its quality and usefulness for own research; • be able to determine independently which data or methods are required to obtain a specific result (or to finish a project); • have an understanding of the subject area's limits, i.e. realise that at a certain stage other expertise should be brought in, or that there is a need for interdisciplinary co-operation; • have 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; • be able to consciously decide whether he/she prefers to continue

	<p>his/her studies in order to obtain a PhD degree or to take up a position outside the academic world;</p> <ul style="list-style-type: none"> • be able to recognise and to judge ethical aspects of science and of the application of science.
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Communication	
Dublin descriptors	Final attainment levels
<p>The graduate should be able to transfer knowledge and skills related to his/her subject area to other persons and to adequately reply to questions and problems posed within society.</p>	<p>The graduate should be able:</p> <ul style="list-style-type: none"> • 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 have excellent skills to co-operate in an international environment; • 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 Basin research. • to apply her/his knowledge in such a way that it demonstrates a professional attitude towards her/his work or profession.
Learning skills	
Dublin descriptor	Final attainment levels
<p>The graduate should develop learning skills that enable him/her further self education and development within the subject area.</p>	<p>The graduate should have developed skills:</p> <ul style="list-style-type: none"> • to work and think within a multidisciplinary framework and to connect different types of factual information; • to independently collect and to critically compile the literature significant to a specific topic to be studied; • use modern techniques to maintain his knowledge up-to-date; • read and understand the relevant Earth scientific journals, as well as the more general natural sciences journals such as Nature and Science; • recognise 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 realise this); • be able to get acquainted with one of the other specializations within the subject area in the course of a few months; • be able to get acquainted within a reasonable time with a subject area within the discipline which is different from the one of the programme; • to adjust to new working-environments and new views and cultural norms.

7.2 Joint degree partner institutions

The master programme is offered by the following partner institutions

Abbreviation	Name associate or core partner institution	Partner type
VU	VU University Amsterdam, the Netherlands	
Re1	Université de Rennes 1, France	Core partner
UIB	Universitetet I Bergen, Norway	Core partner
RWTH	RWTH Aachen University, Germany	Associate partner
UPMC	Université Pierre et Marie Curie – Paris 6, France	Core partner

7.3 Specializations in Geosciences of Basins and Lithosphere

The programme contains the following specializations:

	Specialization	Offered by the following partner institutions (abbreviations, see 7.2)
a	Basin Formation	VU, Re1, UIB
B	Deep Processes	VU, Re1
C	Depositional Environments	Re1
D	Exploration	RWTH
E	Fluid Transport	Re1, UPMC
f	Petroleum Systems and New Energy Resources	VU, Re1, UIB

7.4 Composition of the programme

7.4.1 General setup programme VU

Students follow specializations at two different partner universities. The exchange period is one academic year. The master's core package at the VU University consists of the following compulsory components in the first year.:

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450146	From Source to Sink; Chemical and Physical Cycles	6
AM_450229	Introduction Field Excursion	3
AM_450225	Mantle Properties in Lithosphere Development	3
AM_450190	Orogenesis	6
AM_450179	Petroleum Systems and Regional Geology	3
AM_450193	Portfolio Geosciences of Basins and Lithosphere	3
AM_450154	Sedimentary Basins	6
AM_1105	Research Project GBL I	12
	Total compulsory components for all specializations	42

Second year compulsory components

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450271	Master thesis GBL	30

7.4.2 Basin Formation

First year compulsory components Basin Formation

<i>code</i>	<i>name</i>	<i>EC</i>
	Core package (see 7.4.1 for content)	42
	Specialization package – all compulsory:	
AM_450169	Diagenesis of Sedimentary Rocks	3
AM_450180	Low Temperature Deformations of Rocks and Regions	3
	Specialization package – choose 2 of these 4 modules	
AM_450170	Reflection Seismics	6
AM_450176	Metamorphism and P-T Evolution	6
AM_450189	Magmatic Processes	6
AM_450409	Geothermal Energy	6
	Total compulsory components specialization package	18
	Total EC first year	60

Second year compulsory components Basin Formation

<i>code</i>	<i>name</i>	<i>EC</i>
	Core package (see 7.4.1, second year)	30
AM_450179	Petroleum Systems and Regional Geology	3
AM_450316	3D Seismic Interpretation and Production Geology	6
AM_450317	Petroleum Geology of the North Sea	7
AM_1035	Field Excursion Petroleum Systems and Basin Formation	3
AM_450154	Sedimentary Basins	6
	Optional components (see 7.4.5)	5
	Total EC second year	60

7.4.3 Deep Processes

First year compulsory components

<i>code</i>	<i>name</i>	<i>EC</i>
	Core package (see 7.4.1 for content)	42
	Specialization package:	
AM_450171	Advanced Geochronology	3
AM_450172	Advanced Inorganic Geochemistry	3
AM_450189	Magmatic Processes	6
AM_450176	Metamorphism and P-T Evolution	6
	Total compulsory components specialization package	18
	Total EC first year	60

Second year compulsory components

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450271	Master thesis GBL	30
AM_1034	Deep Processes Field Excursion	3
AM_450225	Mantle Properties	3
AM_450273	Planetary Science	6
AM_450061	Volcanism	3
	Optional components (see 7.4.5)	15
	Total EC second year	60

7.4.4 Petroleum Systems and New Energy Resources

First year compulsory components

<i>code</i>	<i>name</i>	<i>EC</i>
	Core package (see 7.4.1 for content)	42
	Specialization package – all compulsory:	
AM_450169	Diagenesis of Sedimentary Rocks	3
AM_450180	Low temperature deformations of rocks and regions	3
AM_450170	Reflection Seismics	6
	Specialization package – choose one of these modules	
AM_1050	Earth Resources	6
AM_450409	Geothermal Energy	6
	Total compulsory components specialization package	18
	Total EC first year	60

No separate programme in year 2. Please refer to the second-year Basin Formation programme (above)

7.4.5 Optional components

1. The scope for optional components involves opting for components of the Master's programme not yet taken. The optional components of VU are listed below.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450171	Advanced Geochronology	3
AM_450172	Advanced Inorganic Geochemistry	3
AM_450226	Basics in Geographical Information Systems	3
AM_450003	Catchment Response Analysis	6
AM_450004	Climate Modelling	6
AM_450188	Climate and Policy	6
AM_450133	Contaminant Hydrogeology	3
AM_450169	Diagenesis of Sedimentary Rocks	3
AM_450014	Ecohydrology	6
AM_450145	Environmental Remote Sensing	6
AM_450146	From Source to Sink	6
AM_450409	Geothermal Energy	6
AM_450009	Groundwater Hydraulics	6
AM_450132	Groundwater Microbiology and Geochemistry (Geomicrobiology)	6
AM_450292	Historical Geography	6
AM_450052	Hydrochemistry	6
AM_450148	Isotope Hydrology	3
AM_450180	Low Temperature Deformations of Rocks and Regions	3
AM_450189	Magmatic Processes	6
AM_450176	Metamorphism and P-T Evolution	6
AM_450158	Microstructures in Tectonites	6
AM_450054	Palaeo-ecology/Palynology	3
AM_450273	Planetary Science	6
AM_450277	Practical Subsurface Evaluation	2
AM_450164	Precambrian Geology	3
AM_450170	Reflection Seismics	6
AM_1106	Research Project GBL II*	12
AM_450154	Sedimentary Basins	6
AM_450058	Sediment Petrography of Heavy Minerals	3
AM_450131	Transport Processes in Groundwater	6
AM_450061	Volcanism	3

- Research project II applies to research projects started up

2. The scope for optional components can be fulfilled within the Master Earth Sciences by extending the Master's thesis requirement by 6 EC.

7.5 Deviating from the programme

1. As an alternative, the optional component may also be partly or completely fulfilled by taking components from other university Master's programmes. This alternative requires the prior permission of the Examination Board. Before granting permission, the Examination Board will evaluate the content and cohesion of the programme.
2. A *VU University Amsterdam* programme component can be replaced with another

component taught at any other institution of academic education, inside or outside the Netherlands, provided that the alternative component's contents and study load are comparable, and only after prior permission of the Examination Board.

7.6 Sequence of examinations

1. Participation in the components listed below is only possible if the admission requirements have been met.

Participation in the components of the programmes Geosciences of Basins and Lithosphere listed in this appendix is only possible if the following admission requirements are met:

<i>code</i>	<i>subject</i>	<i>entry requirements</i>
AM_1034	Field Excursion Deep processes	registration of at least 12 EC of the master programme concerned, given the February registration date of the course.
AM_1035	Field Excursion Petroleum Systems and Basin Formation	registration of at least 12 EC of the master programme concerned, , given the February registration date of the course.
AM_450271	Master Thesis Geosciences of Basins and Lithosphere	registration of at least 36 EC of the master programme concerned
AM_1105	Research Project GBL I	registration of at least 18 EC of the master programme concerned
AM_1106	Research Project GBL II	registration of at least 18 EC of the master programme concerned

2. On the grounds of a motivated request by the student, the Examination Board may grant an exemption to the condition stipulated in paragraph 7.6.1.

7.7 Admission to the programme

Admission to the master programme Geosciences of Basins and Lithosphere (joint degree)

- 7.7.1 Students who hold a Bachelor's degree in Geology or Geological Engineering with a GPA above average (for VU University Amsterdam BSc: 7.0 or higher) may be admitted to the Master Geosciences of Basins and Lithosphere 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 Geosciences of Basins and Lithosphere and will specify the programme within the Master Geosciences of Basins and Lithosphere to which the candidate is admitted. The Admission Board may make additional demands of the student before granting admission to the Master.

7.8 Cancelled programme components

Compared to academic year 2012-2013, no programme components cease to exist within the master programme.

8 GLOBAL HEALTH

8.1 Final attainment levels

1 The student has knowledge of relevant theoretical frameworks from social, behavioural, and beta sciences. S/he has relevant knowledge of the latest developments within these disciplines in as far as they are connected to Global Health. In particular, the student acquires:

- a) Insight in the most important concepts and theories in the field of Global Health and in relevant related disciplines like health sciences, (bio)medical sciences, management and policy sciences, economics and social sciences including medical anthropology.
- b) Robust knowledge of and insight in system's thinking and the related models, theories, and related concepts (participation, multi-dimensionality, constructivism, complex adaptive systems, non-linear frameworks)
- c) Insight in the relevance and function of scientific research in the field of Global Health in society

2 The student has acquired the knowledge and insight that are essential for conducting scientific research in the field of Global Health. This includes designing, implementing, and evaluating both health interventions and health care systems to address Global Health challenges.

- a) Knowledge on research methodologies in the different subdisciplines of Global Health and their underlying epistemological theories.
- b) Knowledge of relevant quantitative and qualitative research methodologies and research techniques, their inherent advantages and disadvantages and the way they fit in with research methodologies
- c) Insight in the way data are gathered, processed, analysed and reported
- d) Knowledge of and insight in methods to ensure the quality of scientific research (validity, bias, sampling, etcetera)

3 Knowledge in and insight of transdisciplinary research in relation to Global Health issues

- a) The placing of the transdisciplinary research approach with respect to mono-, multi- and interdisciplinary research and insight in the differences and relevance
- b) Knowledge of the status quo concerning theory (epistemology, methodology, inclusive quality criteria) and insight in the most important research questions within transdisciplinary research
- c) Central concepts of transdisciplinary research (active participation of relevant societal actors, collective learning process, systems thinking and so forth)
- d) Insight in relevant concepts and theories for effective communication and co-operation in the framework of transdisciplinary research
- e) Insight in the steps to be taken in transdisciplinary research^[1] and related methodological aspects

4 After graduation the student has an attitude that fits with effectively conducting transdisciplinary research in the field of Global Health

- a) An open, respectful attitude, a reflective, inquisitive nature, critical thinking with regard to ones thinking and handling, cultural sensitivity, and to be aware of the dynamics in group processes and the associated visions, interests and power positions, and to be aware of the broad variation of influences and the willingness to take this into account in research.
- b) The student looking for solutions and takes responsibility for personal development and personal actions.

5 The student has the following general academic capabilities:

- a) Ability to work in projects
- b) The student is able to explain fundamental underlying assumption and theoretical schools of his/her focus in global health to scientists and non-scientists alike, incorporating different lines of reasoning, and with the ability to analyse and defend these different points of view.
- c) The student is able to report findings both in presentations and in reports, for scientists and non-scientists alike
- d) The student is able to define personal learning goals and evaluate their own functioning by both self-reflection and consultation with others
- e) The student has the ability to independently acquire new knowledge and capabilities in future situations (life-long learning)

6 The student has developed the following academic research capabilities

- c) The student can independently acquirer information on Global Health challenges in different relevant disciplines by means of studying literature and conducting emperical research
- d) The student can analyse acquired data in an integral and scientifically critical fashion
- e) The student contributes to scientific discussions on planning research and analysing results

7 The student has the skills for conducting transdisciplinary research with respect to:

- a) Setting up a research plan for transdisciplinary research
- b) Selecting, combining and carrying out methods and techniques for transdisciplinary research and analysing obtained data
- c) Stimulating group processes and learning processes for transdisciplinary research
- d) Communicating and co-operating with researchers from different scientific disciplines, as well as professionals from businesses and health, and with policy makers and citizens from different cultural backgrounds
- e) Integrating knowledge and insight from different alpha-, beta- and gamma disciplines, as well as from relevant societal knowledge
- f) Monitoring and evaluating the quality and effectiveness of transdisciplinary research

8 The student is able to formulate strategies that contribute to solving Global Health issues (on the basis of results from inter- and transdisciplinary research), and to assess them in terms of appropriateness and societal relevance, and thereby continually taking into account ethical and normative aspects.

9 The student has skills for monitoring and evaluating the effectiveness of interventions and system innovations and is able to conduct comparative analyses (by means of transdisciplinary research).

[1] Steps: (1) analyse the problem (a concrete, relevant, complex health issue) by means of a needs assessment; (2) development of an intervention on the basis of evidence from science and practice, and from the perspective of relevant actors; and (3) implementation and evaluation of the intervention

8.2 Specializations in MSc Global Health

The master's programme does not contain specializations.

8.3 Composition of the programme

8.3.1 General setup programme

The programme consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

8.3.2 First year programme

<i>Compulsory components</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_1022	Global Health in Historical Perspective	6
AM_1023	Systems Thinking – Theory and Research Methods I: Health Innovations & Interventions	6
AM_1024	Systems Thinking – Theory and Research Methods II: Analysis of Health Policy and Sustainable Health Systems	6
AM_1025	International Comparative Analysis of Health Systems	6
AM_1102	Research Project Global Health	30
Total compulsory components first year		54
Elective components (choose one)		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_1026	Challenges in Health Systems Innovation	6
AM_1027	Future Medicine	6
AM_1028	Aids, Medicine and Human Rights in a Cross-Cultural, Medical Anthropological Perspective	6
Total elective components first year		6

8.3.3 Second year programme

Course components in the second year of the master programme will be offered in academic year 2013-2014. The following components will be offered (may be subject to changes)

<i>Compulsory components</i>		
<i>Code</i>	<i>name</i>	<i>EC</i>
AM_1044	Advanced Methodology: Interactive Learning and Action in Global Health	6
AM_1045	Addressing Disease Burden in a Global Context	6
AM_471023	Scientific writing in English	3
AM_1046	Literature Review	9
AM_1047	Ethics in Global Health	3
AM_1048	Writing Research Grant Proposal	3
AM_1115	Master Thesis Global Health	30
Total compulsory components second year		60

8.4 Admission to the programme

Admission under additional requirements: Master's programme in Global Health

Admission to the Master's programme in Global Health is dependent on a number of entrance requirements:

1.	a Bachelor degree in one of the core disciplines of Global Health, containing at least 6 EC of epidemiology. Examples are Biology (Biologie), Biomedical Sciences (Medische Biologie), Health and Life (Gezondheid en Leven), Health Sciences (Gezondheidswetenschappen) and Medicine (Geneeskunde), Medical Anthropology (Medische Antropologie), Health Management (Gezondheidsmanagement), Pharmacology (Farmacologie), Health Economics (Gezondheidseconomie), Medical Sciences (medische natuurwetenschappen).
2	average grades during the Bachelor should be 7,5 or higher in the dutch grading system, or a foreign equivalent. Bachelor thesis or internship should at least be graded with an 8.0. Preferentially, the candidates completed their degree at a University College, did a double degree or an honours programme, or have other proof of having completed a bachelor's programme geared toward excellence. Non-EU diplomas will be assessed by the VU desk for International Relations;
3	a letter of motivation stating clearly why the applicant wants to enrol into the Master's programme Global Health at the VU University Amsterdam. Attached should be a CV, indicating extra-curricular activities that underline the candidate's societal engagement and broad interests, and two reference letters, of which at least one should be provided by the supervisor(s) of the candidate's bachelor thesis or internship.
4	Score a sufficient mark on the entrance exam. This exam requires the candidate to answer questions based on a video-recorded lecture and accompanying literature. The exam is web-based, so it can be made from a distance if necessary.
5	Students who meet all the requirements and pass the entrance exam, will be invited for an interview with the director of the Master's programme in Global Health.

8.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_1102	Research Project Global Health	registration of at least 18 EC of the master programme concerned
AM_1115	Master thesis Global Health	

9 HEALTH SCIENCES

9.1 Final attainment levels

Dublin descriptor 1 Knowledge and understanding

The graduate should have specialized theoretical and practical knowledge of Health sciences, notably within the field of specialization.

- The graduate:
- understands that multi- and interdisciplinary approach of health care problems is the core of Health sciences;
- has knowledge of the central role of evidence based research in the development of health promotion and health care and recognizes evidence based scientific outcomes;
- can play a professional role on an academic level in the broad field of Health sciences and has understanding of the role of diversity in health status between different groups and the determinants causing these differences;
- suggests relevant interventions based on evidence from empirical epidemiologic population studies;
- can explain the different views on health depending on the social economic, moral and cultural background;
- has the ability to compare and integrate the different levels of the problem (micro-, meso- and macro).

Dublin descriptor 2 Application of knowledge

The graduate should be experienced in carrying out research, in applying techniques specific to the subject area and applying scientific knowledge to problems raised in society.

- The graduate:
- is able to compare, evaluate and criticize the different approaches of health care problems to decide what is the best approach in this occasion, depending on its professional view and experience;
- is competent to plan, perform, evaluate and report a scientific study in Health sciences;
- is competent to communicate evidence from quantitative and qualitative studies to a lay audience, professionals and decision makers on European, national, regional and local level;
- selects, builds and applies objective and subjective measurements for health and disease as a whole and by components (physical, mental, social), at individual, family and community level;
- combines biomedical knowledge with expected health prognoses/outcome;
- understands that the different health care professionals may have a different perspective on health care problems;
- has the ability to change from the individual scope of the patient to a more organizational or policy context;
- shifts between the local, the national and the international perspective;
- identifies and collects health related information from different sources and uses this information to analyse health (care) problems;
- Is able to compose new theory from existing models to explain new findings;
- reflects on individual experiences to connect these personal experiences with the broader perspectives;
- has the ability to express the central theories of Health sciences in different contexts;
- has the ability to develop a qualitative or quantitative research design suites to solve the question raised;
- has the skills to design a research protocol with a good methodology, common sense, theory driven, achievable depending on time and resources and contributing to a solution for the problem.

Dublin descriptor 3 Critical judgment

The graduate should be able to independently and critically judge information.

- The graduate:
- evaluates the role of ethics in public health and has a well-defined ethical and moral standard when it comes to research and 'truth finding';
- understands the ethical aspects of health research and its applications and considers these arguments in decision making;
- foresees the technical, methodological and ethical limitations and consequences of (interdisciplinary) health research within the specialization chosen;
- judges the scientific and social relevance of research within the own discipline and is able to interpret and evaluate a variety of different methodological studies;
- develops a awareness and critical attitude towards the moral and ethical dimensions of health research and the applications of the outcomes.

Dublin descriptor 4 Communication

The graduate should be able to transfer knowledge and skills related to the subject area to other persons and to adequately reply to questions and problems posed in society.

- The graduate:
- can report orally on research results in English with the help of modern computer techniques;
- can produce an English written article at the level of peer-reviewed academic journals;
- is able to communicate knowledge, insight and political, moral and ethical views with a professional attitude;
- is able to discuss the actual themes in health care such as aging, the development of mental health care, the role of socio-economic inequalities in health and health promotion in vulnerable groups.

Dublin descriptor 5 Learning skills

The graduate should develop learning skills that enable him/her to further self-education and development within the subject area.

- The graduate:
- can identify, retrieve and analyse documentation about population health in specific populations;
- has the ability to interpret the research data and to understand, to translate and to evaluate in the context needed;
- is familiar with computer software and finds his/her way in scientific journals and more specific with the journals in the specialized field;
- is able to choose the route needed for further professional development;
- knows the strengths and weaknesses of its own learning preferences .

The master programme Health sciences contains five specializations. The five specializations aim to give the student an opportunity to focus in a specific area of Health sciences. There is an important overlap in aspects of learning outcomes, such as research skills, communication, forming a judge and ethical reflection as mentioned before. The specializations differ when it comes to the specific knowledge. See Annex 3 for specific Dublin descriptors per specialization.

Table 2 A-E present an overview of the specific end terms of the specializations described in the Dublin descriptors Knowledge and understanding; Applying Knowledge and understanding; Making Judgements;

The full course descriptions can be found in the electronic study guide.

Table 2 A - Final qualifications of the Master's specialization in Health Policy

Knowledge and understanding

Dublin descriptor	The graduate:
At the end of the Master's, Programme, students have acquired specialized theoretical and practical knowledge of research in the area of the policy and organization of the health service.	<ul style="list-style-type: none"> • Has comprehension and appreciation of main health care issues, - including but not limited to - rising health care costs, health care system efficiency, market incentives, rationing, coverage of cost effective interventions, access of vulnerable groups, quality of health care, labor limitations and patient rights; • Is aware of the law and structure that govern the Dutch health care system, including the stakeholders and interest group landscape and the governance structure with quality and competition authorities and internal (in organization) governance; • Is able to apply economic, policy, organizational and management theories and Dutch health law to analyze health care issues at health care system, organizational and intervention level and from both societal and stakeholder perspectives; • Is able to identify, select, evaluate and summarize relevant scientific evidence and translate it into evidence based health care policy □ is able to select research designs to study health policy subjects.
Applying knowledge and understanding in practice	
Dublin descriptor	The graduate:
On the basis of scientific data, students graduating from the Programme are able to write a policy advisory document or an advisory report about the regulation and organization of the health service.	<ul style="list-style-type: none"> • Is able to select research designs to study health policy subjects; • Has an appreciation of the various aspects (epidemiological, social, economic, legal and ethical) and the interests of various stakeholders involved in writing a guideline or advisory report; • Is able to apply the principles of care-sector policy-making for the purpose of analysing the policies of care institutions; • Is able to assess the viability of implementation and to write an implementation plan that incorporates an assessment of the interests of all stakeholders.

Table 2 B - Final qualifications of the Master's specialization in *Prevention and Public Health*

Knowledge and understanding	
Dublin descriptor	The graduate:
At the end of the Master's, Programme, students have acquired specialized theoretical and practical knowledge of theory, research and the field in the area of prevention and public health.	<ul style="list-style-type: none"> • Has knowledge of health promotion & disease prevention; concepts, definitions and history. • Can identify those individual, environmental and lifestyle factors which affects the health of individuals/populations in the short and long term (primary and secondary prevention); • Knows which psycho-social aspects are important in the treatment and management of (chronic) diseases, such as therapy compliance and care worker-patient communication (tertiary prevention); • Is familiar with the relevant behavioural change theories/models relating to the development of healthy behaviour, perceptions of illness, and self regulation; • Knows how knowledge about health and prevention can

	contribute to the development of local and national policy.
Applying knowledge and understanding in practice	
Dublin descriptor	The graduate:
On the basis of scientific data, students graduating from the Programme are able to design interventions, to predict their effects, to implement such interventions, and to evaluate and synthesize the results.	<ul style="list-style-type: none"> • Is able to identify and measure determinants of behaviour on health matters; • Is able to improve peoples' health status and quality of life by development of evidence based health promotion interventions (intervention mapping) • Is able to perform effect and process evaluation; principals, perspectives on process evaluation, and determining the effects of health promotion programs. • Is able to critically appraise scientific publications in the field of health care and prevention.

Table 2 C - Final qualifications of the Master's specialization in *Nutrition and Health*

Knowledge and understanding	
Dublin descriptor	The graduate:
At the end of the Master's, Programme, students have acquired specialized theoretical and practical knowledge of the role of nutrition in health and disease.	<ul style="list-style-type: none"> • Has knowledge on the role of nutrition in the maintenance and promotion of health; • Has knowledge on the role of nutrition in the development of chronic disorders, like obesity, type 2 diabetes mellitus, cardiovascular diseases, cancer and frailty; • Understands the role of nutrition in health and development of chronic disorders within the scope of other life style factors; • Is able to identify qualitative or quantitative research designs for nutrition related research questions; • Has knowledge on the impact of preventive or therapeutic nutritional interventions both in terms of their potential and actual health benefits;
Applying knowledge and understanding in practice	
Dublin descriptor	The graduate:
Students graduating from the programme are able to apply the evidence based approach to nutrition and health research.	<ul style="list-style-type: none"> • Is able to identify and judge scientific evidence for claimed nutrition related health benefits; • Is able to select and apply appropriate research designs, e.g. observational studies (cross-sectional, longitudinal), and experimental studies in various settings (clinical, policy, industry); • Is able to interpret the results of nutrition research for health, for development of various chronic disorders, and for treatment of diseases, on the individual and population level.

Table 2 D - Final qualifications of the Master's specialization in *International Public health*

Knowledge and understanding	
Dublin descriptor	The graduate:
At the end of the Master's, Programme, students have acquired specialized theoretical and practical knowledge of international public health.	<ul style="list-style-type: none"> • Is familiar with the relevant methods and techniques (and with their value and limitations) needed to analyse international health issues from an interdisciplinary perspective, and is familiar with the limitations of these methods and techniques; • Possesses a proven knowledge and understanding of

	<p>interdisciplinary research aimed at solving international public health issues;</p> <ul style="list-style-type: none"> • Possesses a knowledge and understanding of the concepts and theories that underpin effective communication and collaboration.
Applying knowledge and understanding in practice	
Dublin descriptor	The graduate:
Is capable of using knowledge, understanding, and problem-solving abilities in new or unfamiliar circumstances within the broader (multidisciplinary) context of international public health; is able to integrate knowledge and to deal with complex material.	<ul style="list-style-type: none"> • Is capable of integrating knowledge and understanding of the relevant scientific disciplines in the field of international public health, and of assessing the value of the contribution made by each individual academic discipline; • Is able to formulate intervention strategies for international public health issues on the basis of interdisciplinary research and is capable of analysing the role, contribution and effectiveness of proposed interventions in the field of international public health; • Is aware of the major barriers to the implementation of 'containment strategies' for infectious diseases, with a focus on the part played by vaccination Programmes; • Describes how health interventions are designed and implemented by international advisory bodies, the WHO, NGOs, and implementing agencies.

Table 2 E - Final qualifications of the Master's specialization in *Infectious diseases and Public Health*

Knowledge and understanding	
Dublin descriptor	The graduate:
At the end of the Master's, Programme, students have acquired specialized theoretical and practical knowledge of the relation between infectious diseases and public health.	<ul style="list-style-type: none"> • Possesses a knowledge of the immunological aspects, development and expression of infectious disease and of the epidemiology, control and elimination of various parasites, as well as of the appropriate vaccinations • Knows the life cycle, virulence and transmission of parasites, and of the outcome of diseases, in addition to being able to describe the various diagnostic laboratory tests for parasitic infections; • Is able to describe the relationship between nutrition and the appearance/development of infectious diseases, knows the causes and effects of malnutrition and over-nutrition in relation to infectious diseases with a special focus on vulnerable groups and/or populations; • Can identify the major geographical concepts related to health geography, also able to critically examine distribution maps and spatial perspectives.
Applying knowledge and understanding in practice	
Dublin descriptor	The graduate:
On the basis of scientific data, students graduating from the Programme are able to design interventions applicable to infectious diseases, to predict their effects, to	<ul style="list-style-type: none"> • Is capable of integrating knowledge and understanding of the relevant scientific disciplines in the field of infectious diseases, and of assessing the value of the contribution made by each individual academic discipline; • Is able to indicate which prevention and/or treatment programmes are effective against various infections and to formulate intervention strategies and to plan and organize

implement such interventions, and to evaluate and synthesize the results.	<p>interventions</p> <ul style="list-style-type: none"> • is able to estimate the severity and the development of infectious diseases, or to formulate a research design that will generate the data needed to support such an estimate; • Is aware of the major barriers to the implementation of 'containment strategies' for infectious diseases, with a focus on the part played by vaccination programmes; • is capable of weighing up the pros and cons of diagnostic techniques in practice (cost, reliability, false positives/negatives); • Is able to describe how health interventions are designed and implemented by international advisory bodies, the WHO, NGOs, and implementing agencies.
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9.2 Specializations in MSc Health Sciences

The programme contains the following specializations:

- Infectious Diseases and Public Health
- International Public Health
- Nutrition and Health
- Health Policy
- Prevention and Public Health

9.3 Composition of the programme

9.3.1 General setup programme

The programme consists of the following components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

	EC
Research/Student Placement (including thesis)	27
Other compulsory courses	15-21*
Optional courses	12-18*

* depending on the specialization

9.3.2 Infectious Disease and Public Health

For a specialization degree 2 courses and 1 out of 3 optional courses (together 18 EC, see below) plus one *Research/Student Placement* (30 EC) are compulsory (together at least 48 EC).

<i>Compulsory components</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_471105	Internship Infectious Diseases and Public Health	27
AM_470806	Care and Prevention Research	6
AM_470816	Nutrition and Infectious Disease	6
AM_471023	Scientific Writing in English	3
Total compulsory components		42 EC
Restricted options (at least 1 component (6 EC) is compulsory)		
AM_470127	Containment Strategies	6
AM_470094	Health Geography	6
AM_470052	Parasitology	6

Optional components:

Students are required to supplement the above mentioned compulsory components and restricted options with optional components which are listed in paragraph 9.3.8 up to a total of at least 60 EC.

9.3.3 International Public Health

For a specialization degree 3 courses (18 EC, see below) and one *Research/Student Placement* and a thesis (total 30 EC) are compulsory (together at least 48 EC).

Compulsory components		
code	name	EC
AM_471106	Internship Public Health	27
AM_470127	Containment Strategies Infectious Diseases	6
AM_470819	Policy, Management and Organisation in IPH	6
AM_470817	Research Methods for Needs Assessment	6
AM_471023	Scientific Writing in English	3
Total compulsory components		48 EC
Optional components (12 EC)		
AM_470588	Disability and Development	6
AM_470818	Health, Globalisation and Human Rights	6
AM_470820	International Comparative Analysis of Health Sciences	6
AM_470816	Nutrition and Infectious Disease	6
Total optional EC to be obtained		12 EC

Optional components:

Students are required to supplement the above mentioned compulsory components with optional components which are listed in paragraph 9.3.8 up to a total of at least 60 EC.

9.3.4 Nutrition and Health

For a specialization degree 3 courses (18 EC, see below) plus one *Research/Student Placement* (30 EC) are compulsory (together at least 48 EC).

Compulsory components		
code	name	EC
AM_471107	Internship Nutrition and Health	27
AM_470806	Care and Prevention Research	6
AM_470815	Public Health Nutrition	6
AM_471023	Scientific Writing in English	3
Total compulsory components		42 EC
Restricted options (at least 1 component (6 EC) is compulsory)		
AM_470816	Nutrition and Infectious Disease	6
AM_470842	Nutrition in Clinical Practice	6
AM_470841	Nutrition in Health and Disease	6

Optional components:

Students are required to supplement the above mentioned compulsory components and restricted options with optional components which are listed in paragraph 9.3.8 up to a total of at least 60 EC.

9.3.5 Health Policy

For a specialization degree 2 courses and 1 out of 6 optional courses (see below) plus one *Research/Student Placement* (30 EC) are compulsory (together at least 48 EC).

Compulsory components		
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<i>code</i>	<i>name</i>	<i>EC</i>
AM_1109	Internship Health Policy	27
AM_470843	Advanced Health Economics	6
AM_470806	Care and Prevention Research	6
AM_471023	Scientific Writing in English	3
Total compulsory components		42 EC
Optional components		
AM_470844	Advanced Health Law	6
AM_470826	Advanced Statistics	6
AM_470828	Economic Evaluation	6
AM_470822	Management in Health Organisation	6
AM_470819	Policy, Management and Organization in International Public Health	6
AM_470809	Regulation and Organisation of Health Care	6

Optional components:

Students are required to supplement the above mentioned compulsory components with optional components which are listed in paragraph 9.3.8 up to a total of at least 60 EC.

9.3.6 Prevention and Public Health

For a specialization degree 2 courses and 1 out of 4 optional courses (together 18 EC, see below) plus one *Research/Student Placement* (30 EC) are compulsory (together at least 48 EC).

<i>Compulsory components</i>		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_471104	Internship Prevention and Public Health	27
AM_470806	Care and Prevention Research	6
AM_470811	Health Promotion & Disease Prevention	6
AM_471023	Scientific Writing in English	3
Total compulsory components		42 EC
Restricted options (at least 1 components (6 EC) is compulsory		
AM_470129	Communication Campaigns and Research	6
AM_470730	Health Psychology	6
AM_470823	Prevention and Policy	6
AM_470840	Prevention of Mental Health Problems	6

Optional components:

Students are required to supplement the above mentioned compulsory components and restricted options with optional components which are listed in paragraph 9.3.8 up to a total of at least 60 EC.

9.3.7 Flexible programme

A flexible programme is a research programme of one year comprised of the compulsory components listed under 9.3.1. With regard to optional courses, students may fulfil their programme with selected courses from other specialization programmes within the Master's programme in Health Sciences and educational units defined under 7.5. The sequence of the programme is not defined.

9.3.8 Optional components

<i>Optional components</i>
With regard to optional courses, students may fulfil their programme with selected courses from other specialization programmes within the Master's programme in Health Sciences. Furthermore students can choose from the following courses:

<i>code</i>	<i>name</i>	<i>EC</i>
AM_1036	Advanced Dietetics	6
AM_470813	Migration, Culture, Health and Research	6
Furthermore students can choose from courses and capita selecta that have defined Master students in Health Sciences as target audience.		

9.4 Deviating from the programme

1. In order to broaden their knowledge students may also take selected capita selecta and courses from the other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of placement. The student must request this in writing before the end of the placement. The request must be underpinned by reasons related to the work in question.

9.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471105 AM_471106 AM_471107 AM_1109 AM_471104	Internship Infectious Diseases and Public Health Internship International Public Health Internship Nutrition and Health Internship Health Policy Internship Prevention and Public Health	registration of at least 18 EC of the master programme concerned
AM_1109	Internship Health Policy	Students must have successfully completed the courses AM_470806 Care and Prevention Research and AM_470843 Advanced Health Economics
AM_471104	Internship Prevention and Public Health	Students must have successfully completed the courses AM_470806 Care and Prevention Research and AM_470811 Health Promotions and Disease Prevention
AM_471106	Internship International Public Health	Students must have successfully completed the courses AM_470817 Research Methods for Needs Assessments and AM_470127 Containment Strategies
AM_471105	Internship Infectious Diseases and Public Health	Students must have successfully completed the course <i>AM_470806 Care and Prevention Research</i>
AM_471107	Internship Nutrition and Health	Students must have successfully completed the course <i>AM_470806 Care and Prevention Research</i>

9.6 Admission to the programme

Admission to the master programme Health Sciences

9.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Article 9.6.2 lists all degrees that provide direct admission or are subject to additional requirements.
9.6.2	Direct admission is provided to the Master's programme in Health Sciences for students with a Bachelor of Science degree in Health Sciences or with a Bachelor of Science degree in Health and Life Sciences with a major in Health Sciences Programmes include those from the VU or another Dutch university; in the latter case, permission from the Admission Board is required. In addition, applicants having a Bachelor's degree in Biomedical sciences, Science of Movement, Psychology and in Medicine, have to meet a number of entrance requirements: They may enter the programme if they have sufficient knowledge of Epidemiology and fulfill the demands of the specialization as mentioned on the website. Students with a bachelor degree from the university colleges (Utrecht, Amsterdam and Middelburg) may enter the programme if they have sufficient knowledge in epidemiology.
9.6.3	Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than listed in Article 9.5.2, will not receive direct admission to the programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the Admission Board of the Master's programme. The Admission Board may make additional demands of the student before granting admission to the Master's programme.
9.6.4	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the Admission Board of the Master's programme. The Admission Board may make additional demands of the student before granting admission to the Master's programme.
9.6.5	In all cases other than those specified in Paragraphs 1 to 4, the final decision rests with the Admission Board.
9.6.6	Students in possession of a degree obtained at an institution outside of the Netherlands, which is equivalent to the required Bachelor's degree, may be admitted to the programme on the basis of a decision to that effect taken by the Admission Board of the Master's programme. The Admission Board may make additional demands of the student before granting admission to the Master's programme.

9.7 Cancelled programme components

Compared to academic year 2012-2013, no programme components cease to exist within the master programme.

10 HYDROLOGY

10.1 Final attainment levels

The primary objectives of the Master's programme are:

The graduate should:

- have specific and fundamental theoretical and practical knowledge of Earth Science processes, notably within his/her field of specialisation, as a basis for predicting the further course of processes, including the role of mankind now and in the future. The need for 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.
- be experienced in carrying out research. This experience is gradually developed through the confrontation with research and with active researchers and subsequently through active participation in research, 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.
- function in his/her discipline at an academic level, both mentally and in daily practice; the programmes stimulate the social and personal development of the student by motivating consciousness, independence, communicative behaviour and co-operation.
- recognise 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 realise this).
- gain 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.
- be able to start and successfully complete a PhD thesis 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.

Final attainment levels of the Master Hydrology in relation to Dublin descriptors	
Knowledge and insights	
Dublin descriptor	Final attainment levels
The graduate should have specialised theoretical and practical knowledge of the science of hydrology	<p>The graduate has profound knowledge of and insight in:</p> <ul style="list-style-type: none"> • common hydrological terminology and theory that is required to understand the development of new hydrological theory and research issues that are presently deemed of major importance in hydrological sciences; • all aspects of the global water cycle; • theory of groundwater and surface water flow, soil physics, and the surface energy balance (evaporation theory); • how water interacts with soil, rock, vegetation and the atmosphere and how this affects the chemical composition and nutrient fluxes (weathering, dissolution and deposition processes); • the role of the hydrological cycle in Earth's climate system • the dynamic response of groundwater and surface water to short and long-term variations in climate (e.g. rainfall and drought events); • hill slope processes leading to the generation of overland flow and soil

	<p>erosion;</p> <ul style="list-style-type: none"> • the impact of land use changes on water salinity in dry lands; • modelling techniques for solving water quantity and quality issues; • mathematics, physics and chemistry that conforms to the standard needed to conduct modern hydrological research; • the most important hydrological methodology and instrumentation techniques; including familiarity with state-of-the-art groundwater transport, runoff generation and soil-water-vegetation exchange computer simulation models to solve hydrological problems; • measurement techniques related to the exploration of groundwater (geophysics, tracer methods); • the links between hydrology and related sciences (earth and soil sciences, biology, physics, meteorology); • the possibilities of using physical and biological methods to remediate groundwater pollution.
<p>Application of knowledge and insight</p>	
<p>Dublin descriptor</p>	<p>Final attainment levels</p>
<p>The graduate should be experienced in carrying out research. This experience is developed through the confrontation with research and active researchers and through active participation in research.</p> <p>The graduate should be able to apply scientific knowledge to problems raised in society.</p>	<p>The graduate is able to:</p> <ul style="list-style-type: none"> • formulate a problem based on raw data and/or data from a literature study and design a scientific approach for researching and solving the problem; • formulate a research proposal, which includes the problem formulation, the hypotheses, the proposed execution and the finalisation of the project; • independently set up and execute a new hydrological field experiment; • select the appropriate and most efficient techniques for field and laboratory data collection; • apply these techniques to independently collect data for the formulation and testing of hypotheses; • develop conceptual and physical models suited for the testing of the hypotheses; • validate and calibrate hydrological models • select and order information according to its importance for the study and be able to draw connections between different datasets; • apply hydrological knowledge to solve problems related to the use of water in our society; • to start and successfully complete a PhD study; • to successfully compete in the international market for positions at an academic level with government or government-related institutions, private companies, or elsewhere.
<p>Critical judgement</p>	
<p>Dublin descriptor</p>	<p>Final attainment levels</p>

<p>The graduate should be able to independently and critically judge information.</p> <p>The graduate should be able to think within a multidisciplinary framework</p> <p>The graduate has an understanding of his/her personal stronger and weaker points,</p>	<p>The graduate should:</p> <ul style="list-style-type: none"> • understand professional literature and to judge its quality and usefulness for own research; • be able to analyse existing hydrological research projects with respect to the planning, the execution and the evaluation of the results; • understand the role of hydrological sciences within earth sciences, natural and engineering sciences and how hydrological knowledge can be used to improve our society; • know the limitations of hydrological instruments and measurement techniques and how to take these into account for critically evaluating his measurement; • think in a multidisciplinary way and recognise the importance of (sub)disciplines for his own specialization and connect different types of factual information; • have an understanding of the subject area's limits, i.e. realise that at a certain stage other expertise should be brought in, or that there is a need for interdisciplinary co-operation; • have 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; • be 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; • be able to recognise and to judge ethical aspects of science and of the application of science.
<p>Communication</p>	
<p>Dublin descriptor</p>	<p>Final attainment levels</p>
<p>The graduate should be able to transfer knowledge and skills related to his/her subject area to other persons and to adequately reply to questions and problems posed within society.</p>	<p>The graduate should be able:</p> <ul style="list-style-type: none"> • to complete a report on trainee work, subject matter studied, or research carried out, • 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 actively and constructively participate in discussions on hydrological issues and meetings; • to work together with one or several colleagues with different scientific backgrounds (e.g. social and economical sciences); • to translate his scientific findings into a language that is understandable for the managers of water resources, as well as for the public in general.
<p>Learning skills</p>	
<p>Dublin descriptor</p>	<p>Final attainment levels</p>
<p>The graduate should develop</p>	<p>The graduate is able to:</p>

<p>learning skills that enable him/her further self education and development within the subject area.</p> <p>The graduate should function in his/her discipline at an academic level, both mentally and in daily practice.</p>	<ul style="list-style-type: none">• independently collect information on hydrological subjects and analyse, summarise and critically evaluate this information;• use modern techniques to maintain his knowledge up-to-date;• read and understand the hydrological journals, as well as the more general natural sciences journals such as Nature and Science;• recognise 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 realise this);• recognise cultural and gender aspects of water issues;• have an understanding of the existence and significance of related subject areas;• to get acquainted with one of the other specializations within the subject area in the course of a few months;• to get acquainted, within a reasonable time, with a subject area different from the one of the programme.
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10.2 Specializations in MSc Hydrology

The master's programme does not contain specialisations

10.3 Composition of the programme

10.3.1 First year programme

This applies to all first year students who registered for a Master's programme for the first time in 2013-2014.

The first year programme contains compulsory components and elective (free optional) components.

First year Hydrology – compulsory components		
<i>code</i>	<i>name</i>	<i>EC</i>
AM_450003	Catchment Response Analysis	6
AM_450014	Ecohydrology	6
AM_450145	Environmental Remote Sensing	6
AM_450126	Field Course Netherlands	3
AM_1013	Field Course Hydrology Portugal	15
AM_450052	Hydrochemistry	6
AM_1012	Hydrological Systems and Water Management	3
AM_450009	Groundwater Hydraulics	6
AM_450021	Unsaturated Zone and Near Surface Hydrological Processes	6
	Total first year compulsory components	57 EC
First year elective components (3 EC)		
Students are required to select free optional modules from the list presented in paragraph 10.3.3.		

10.3.2 Second year programme

This applies to all second year students who registered for a Master's programme for the first time in 2012-2013.

Compulsory components

The second year compulsory components of the Master's programme are:

<i>code</i>	<i>name</i>	<i>EC</i>
AM_1104	Master Thesis Hydrology	27
AM_450008	Groundwater Flow Modeling	6
AM_450131	Transport Processes in Groundwater	6
	Total compulsory components second year	39 EC

Elective components

Second year students are required to select optional components up to a total of 21 EC from the list presented in paragraph 10.3.3.

10.3.3 Elective components

The scope for free optional components involves opting for components not yet taken. As an alternative, the optional components may also be partly fulfilled by extending the master thesis by 12 EC.

Elective (free optional) components Hydrology
Students are required to select free optional components from the list presented below.

<i>code</i>	<i>name</i>	<i>EC</i>
AM_450227	Applied Geographical Information Systems	3
AM_450137	Aquatic Ecology	6
AM_450226	Basics in Geographical Information Systems	3
AM_450004	Climate Modeling	6
AM_450405	Exploring Earth Resources and Earth Processes	6
AM_450132	Geomicrobiology	6
AM_450409	Geothermal Energy	6
AM_450148	Isotope Hydrology	3
AM_471023	Scientific Writing in English	3
AM_1015	Sustainable Land Management	6
AM_468021	Water & Policy	6

10.4 Deviating from the programme

- With regard to optional courses, students may also take selected subjects and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
- A *VU University Amsterdam* programme component can be replaced with another component taught at any other institution of academic education, inside or outside the Netherlands, provided that the alternative component's contents and study load are comparable, and only after prior permission of the Examination Board.
The optional component can also be fulfilled to a maximum of 18 EC by selecting components not yet taken belonging to the Bachelor's programme in Earth Sciences at the *VU University Amsterdam*, as listed in the relevant Academic and Examination Regulations. This exception is valid only for academic year 2013-2014.

10.5 Sequence of examinations

- Participation in the components listed below is only possible if the admission requirements have been met.

Participation in the components of the programmes Hydrology listed in this appendix is only possible if the following admission requirements are met:

<i>code</i>	<i>subject</i>	<i>entry requirements</i>
AM_1104	Master Thesis Hydrology	registration of at least 36 EC of the master programme concerned
AM_1013	Field Course Hydrology (Portugal)	Students must have completed Field Course Netherlands (AM_450126) and at least two of the courses Catchment Response Analysis (AM_450003), Groundwater Hydraulics (AM_450009), Hydrochemistry (AM_450052) and Unsaturated Zone and Near Surface Hydrological Processes

		(AM_450021) before April 1 of the year in which the field course is organised
AM_450126	Field Course Netherlands	Students must have completed at least two of the courses Catchment Response Analysis (AM_450003), Groundwater Hydraulics (AM_450009), Hydrochemistry (AM_450052) and Unsaturated Zone and Near Surface Hydrological Processes (AM_450021) before April 1 of the year in which the field course is organised.

2. On the grounds of a motivated request by the student, the Examination Board may grant an exemption to the condition stipulated in Article 10.1 of these Academic and Examination Regulations.

10.6 Admission to the programme

Admission to the master programme Hydrology

10.6.1	Students with a Bachelor of Science degree in Earth Sciences from the <i>VU University Amsterdam</i> will receive direct admission to the Master Hydrology. The additional admission requirements detailed below apply to the programmes within the Master Hydrology, as listed in Article 8.1
	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (Variant I/Solid Earth) will receive direct admission to the Master Hydrology.
-	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences (Variant II/Earth Surface) will receive direct admission to the Master Hydrology.
-	Students who have successfully completed the Bachelor's degree examinations in Earth Sciences and Economics ('Aarde en Economie'), including a minor Earth Sciences ('Aardwetenschappen') with the components <i>Toegepaste geofysica (450142)</i> , <i>Wis- en Natuurkunde (450073)</i> and <i>Inleiding in de anorganische geochemie (450236)</i> , will receive direct admission to the master <i>Hydrology</i> .
10.6.2	Students with a Bachelor of Science degree in Earth and Economics from the <i>VU University Amsterdam</i> will receive direct admission to the Master Hydrology, provided that they have successfully completed the "Minor Aardwetenschappen ter voorbereiding op de master Hydrology" ("Minor Earth Science as a preparation for the master Hydrology"). The additional admission requirements detailed below apply to the programmes within the Master Hydrology, as listed in Article 8.1
10.6.3	Students who hold a Bachelor's degree in Earth Sciences from a Dutch university other than the <i>VU University Amsterdam</i> may be admitted to the Master Hydrology at the <i>VU University Amsterdam</i> on the basis of a decision to that effect taken by the Examination Board of the Master. In taking this decision, the Examination Board will specify the programme within the Master Hydrology to which the student in question is admitted. The Examination Board may make additional demands of the student before granting admission to the Master.
10.6.4	Student who hold a Bachelor's degree in a science or technical subject from a Dutch university may be admitted to the Master Hydrology at the <i>VU University Amsterdam</i> on the basis of a decision to that effect taken by the Examination Board of the Master. The Examination Board will determine whether the Bachelor's programme completed by the candidate is sufficiently relevant to warrant admission to the Master Hydrology and will specify the programme within the Master Hydrology to which the candidate is admitted. The Examination Board may make additional demands of the student before granting

	admission to the Master.
10.6.5	Students who hold a certificate of higher vocational education (HBO) may be admitted to the Master Hydrology at the <i>VU University Amsterdam</i> on the basis of a decision to that effect taken by the Examination Board of the Master. The Examination Board will determine whether the higher vocational (HBO) programme completed by the candidate is sufficiently relevant to warrant admission to the Master Hydrology and will specify the programme within the Master Hydrology to which the candidate is admitted. The Examination Board may make additional demands of the student before granting admission to the Master.
10.6.6	Students who hold an equivalent qualification from an institution outside of the Netherlands may be admitted to the Master Hydrology at the <i>VU University Amsterdam</i> on the basis of a decision to that effect taken by the Examination Board of the Master. The Examination Board will determine whether the foreign qualification is sufficiently relevant to warrant admission to the Master Hydrology and will specify the programme within the Master Hydrology to which the candidate is admitted. The Examination Board may make additional demands of the student before granting admission to the Master.

10.7 Cancelled programme components

The following programme components are no longer part of the master programme;
none

11 LIFESTYLE AND CHRONIC DISORDERS (LCD)

11.1 Final attainment levels

Final attainment levels for the programme

Knowledge and insight

The qualified master:

- has knowledge about terminology, state of the art of theory and research topics in the field of lifestyle and chronic disorders
- can apply this knowledge in designing the study based on a specific research question, data gathering, data analysis and reporting.
- is able to understand statistical analyses and knows how to explain the output
- has command of the use of computer software relevant for the field

Applying knowledge and insight

The qualified master:

- has command of research methods to design and carry out studies especially in the field of lifestyle and chronic disorders
- has knowledge about the advanced statistical and epidemiological methods, i.e. longitudinal- and multilevel analysis, bootstrapping, cost-effectiveness and cost-utility analysis, and can apply independently these methods in designing and executing trials in the field of health research and analyse the results.
- can apply health scientific knowledge on issues in society
- is able to link data gathered within multidisciplinary disciplines
- can think multidisciplinary and has insight in the relevant disciplines of the current research field of lifestyle and chronic disorders
- is able to acquire health scientific information and can summarize the core message of a health related subject adequately.

Opinion

The qualified master:

- can reflect on ethical aspects of research and applications of research and on implications in decision making
- can analyse and evaluate independently and critically the planning, execution and results of research
- has insight in the scientific and societal relevance of the current research field of lifestyle and chronic disorders

Communication

The qualified master:

- can report orally on research results, both in English and Dutch with support of modern presentation techniques
- can report in written form on research results on the level of peer-reviewed academic journals and uses references correctly
- contributes to scientific discussions about plans, results and consequences of research
- is not only able to demonstrate his/her knowledge and arguments but also can observe and listen to arguments of others as well
- is able to communicate on academic level with experts from different fields in health sciences and thus fulfilling a bridging function.
- is able to collaborate multidisciplinary disciplines and groups

Learning objectives

The qualified master:

- is able to reflect on the acquired knowledge and skills
- can evaluate his or her own functioning and personal goal setting, both by reflection and in discussions with others
- has gained practical experiences during the two internships and does know her or his personal strengths and weaknesses.
- is able to write independently a research grant for a Ph.D. trajectory
- is familiar with the national and international scientific peer reviewed journals in the fields of Lifestyle and chronic disorders
- is able to acquire independently health scientific information, and can analyse, summarize and critically evaluate this information
- has been able to influence his or her personal learning process by the choice of courses.
- does possess the ability to independently learn skills and knowledge to as part of a lifetime learning process

In addition to these, the graduate:

- has proven excellence as researcher in the field of lifestyle and chronic disorders
- has proven understanding of the organizational principles in the field of Lifestyle and chronic disorders.
- has proven expertise with the modern epidemiology, advanced methodology and statistics in the research field of lifestyle and chronic disorders, and public health.
- has insight in the most important epidemiological, statistical and methodological topics of the moment, and in how these can be approached
- has a unique and excellent profile at the interface between the medical and Health Sciences

11.2 Specializations in MSc LCD

The master's programme does not contain specializations

11.3 Composition of the programme

As of academic year 2013-2014 the master LCD is no longer offered by our faculty. Students who have taken the Master LCD in academic year 2012-2013 or before, are eligible to sit the examination leading to the title of Master of Science in Lifestyle and Chronic Disorders until 31-12-2014.

The Master's examination programme consists of the following components, with the study load for each component given in EC. Eight courses (42 EC, see below) and two Research Placements (each 30 EC) are compulsory. This programme applies to all second year students. who register for a Master's programme for the first time in 2012-2013 or before.

Second year LCD		
AM_471100	Internship LCD*	60
AM_471101	First Internship LCD*	30
AM_471102	Second Internship LCD*	30
Total EC to be obtained		60

- Students have to choose between one internship of 60 EC or two internships of 30 EC.

11.4 Deviating from the programme

1. With regard to optional courses, students may also take selected subjects and courses

from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.

- The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of placement. The student must request this in writing before the end of the research placement. The request must be underpinned by reasons related to the work in question.

11.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471100	Internship LCD	registration of at least 30 EC of the master programme concerned
AM_471101	First Internship LCD	
AM_471102	Second Internship LCD	

11.6 Admission to the programme

As of academic year 2013-2014, the master programme is no longer open for admission.

11.7 Cancelled programme components

The following (first year) programme components are no longer part of the master programme.

code	titel	EC	In 2012-2013 part of	2013-2014
AM_470826	Advanced Statistics	6	First year, compulsory	*
AM_470829	Clinimetrics	6	First year, compulsory	*
AM_470828	Economic Evaluation	6	First year, compulsory	*
AM_470805	Ethics in Public Health	3	First year, compulsory	*
AM_470825	Evidence Based Practice 1: Generating Evidence	6	First year, compulsory	*
AM_470827	Evidence Based Practice 2: Implementing Evidence	6	First year, compulsory	*
AM_471023	Scientific Writing in English	3	First year, compulsory	*
AM_470830	Writing a Research Grant Proposal	6	First year, compulsory	*
AM_1011	Caput Human Nutrition, Obesity and Diabetes Mellites 2	6	First year, optional	*
AM_470839	Caput Lifestyle and Successful Aging	6	First year, optional	*
AM_470831	Caput Mental Health	6	First year, optional	*
AM_1010	Caput Musculoskeletal Health and Work	6	First year, optional	*
AM_470837	Caput Overweight Prevention in the Young	6	First year, optional	*
AM_470835	Caput Physical Activity	6	First year, optional	*

*Students who have not completed the above mentioned course components successfully, will be granted another opportunity. Please consult the course coordinator to make arrangements.

12 MANAGEMENT, POLICY ANALYSIS AND ENTREPRENEURSHIP IN THE HEALTH AND LIFE SCIENCES (MPA)

12.1 Final attainment levels

Dublin descriptor 1: Knowledge and understanding

The graduate has theoretical and practical knowledge of management, policy analysis and entrepreneurship in the health and life sciences, in particular within the field of his/her specialization

The graduate:

- a. can demonstrate knowledge and understanding that are founded upon and extend the knowledge and understanding typically associated with the scientific discipline at the bachelor level (at least in one specific area of that discipline);
- b. has insight into the various relevant disciplines in the social and behavioural sciences. More specifically, the student acquires insight into:
 - o important concepts and theories in the field of policy science, management studies, applied philosophy and science, technology and society studies;
 - o the relation of these gamma sciences to the beta sciences, in particular health and life sciences;
- c. has insight into concepts and the latest theories, research methodologies, analytical models and important research questions related to interdisciplinary research for addressing societal problems;
- d. has knowledge of, and insight into, relevant concepts and theories for effective communication and collaboration;
- e. understands group processes and knows methods and techniques to facilitate them within the framework of interdisciplinary research.

Dublin descriptor 2: Applying knowledge and understanding

The graduate is experienced in carrying out interdisciplinary research, in applying techniques specific to the subject area and in applying scientific knowledge to societal problems.

The graduate:

- a. can apply independently the research methodology used within the research field of specialization;
- b. has the ability to integrate knowledge from the beta and gamma sciences, as well as from science and practice;
- c. can apply scientific knowledge to formulate solutions to societal problems and assess them for appropriateness and societal relevance, while considering ethical and normative issues;
- d. is able to reflect on the ethical aspects of research and its uses, and include these deliberations in the decision-making process;
- e. adopts an appropriate attitude towards the correct and unbiased use and presentation of data.

Dublin descriptor 3: Making judgements

The graduate is able to independently and critically judge information.

The graduate is able to:

- a. independently acquire information in relevant areas in the health and life sciences and social and behavioral sciences through a literature review and by conducting empirical research, as well as evaluate such information critically;
- b. select and order information, distinguish essentials from trivialities, and recognize connections;
- c. independently and critically analyze research in the field of specialization, in relation to its design, planning and execution, and to the results obtained;
- d. formulate personal learning objectives and critically evaluate own performance, both

introspectively and in discussion with others.

Dublin descriptor 4: Communication

The graduate is able to transfer knowledge and skills related to his/her subject area to other people and to adequately reply to questions and problems posed within society.

The graduate:

- has acquired skills to report orally and in writing on research results in English;
- has the ability to communicate research conclusions, and the knowledge and rationale underpinning them, to specialist audiences and non-specialist audiences clearly and unambiguously;
- can collaborate with researchers from various scientific disciplines as well as professionals from industry and healthcare, policymakers and the general public;
- can make essential contributions to scientific discussions about plans, results and consequences of research.

Dublin descriptor 5: Learning skills

The graduate has developed learning skills that enable him/her to continue with self-education and development within the subject area.

The graduate:

- is able to understand and summarize the scientific literature within the field of specialization;
- has acquired skills to develop a research plan, giving details of the problem statement, objectives, research questions, research approach, research methods, and planning;
- is familiar with the general scientific journals, such as *Nature* and *Science*, and with journals in the specialisation, such as *Research Policy*, *Health Policy*, *Science, Technology & Human Values*, *Social Science & Medicine*, and *International Journal on Technology Management*;
- Is familiar with relevant computer software;
- has the learning skills to allow him/her to continue to study in a manner that may be largely self-directed or autonomous (life-long learning).

12.2 Specializations in MSc MPA

The programme contains the following specializations:

- Communication in the Health and Life Sciences
- Health and Life Science-Based Management and Entrepreneurship
- Health and Life Science-Based Policy
- International Public Health

12.3 Composition of the programme

12.3.1 General setup MPA

General compulsory MSc courses			
code	name	EC	year
AM_471023	Scientific Writing in English	3	Year 1 or 2
AM_471017	History of Life Sciences	3	Year 2
AM_470707	Ethics in Life Sciences	3	Year 1 or 2
	subtotal	9 EC	
MPA specific compulsory courses			
AM_470571	Analysis of Governmental Policy	6	First year
AM_470572	Communication, Organization and Management	6	First year

AM_470586	Managing Science and Technology in Society	6	Second year
AM_470582	Qualitative and Quantitative Research Methods	6	First year
	subtotal	24 EC	
MPA internships and theses (compulsory)			
AM_471116*	Internship I MPA	30	
AM_471117*	Internship II MPA	30	
AM_471126	Thesis MPA	9	
*these course codes apply for students who do not register for a specialization			
	subtotal	69 EC	
Beta-oriented course **		6 EC	
AM_470585	Clinical Development and Clinical Trials	6	
** Students who wish to conduct another Beta-oriented course need permission from the Examination Board..			
Optional components (12 EC to be obtained)		12 EC	
AM_470584	Business Management in Health and Life Sciences	6	
AM_470585	Clinical development and clinical trials	6	
AM_470127	Containment strategies for infectious diseases in global context	6	
AM_470588	Disability and Development	6	
AM_470575	Entrepreneurship in the health and life sciences	6	
AM_470818	Health, globalization and human rights	6	
AM_470820	International comparative Analysis of Health care systems	6	
AM_1052	Innovation Behaviour and Economy	3	
AM_470583	Management of Corporate Social Responsibility	6	
AM_470589	Policy, Politics and Participation	6	
AM_470587	Science and communication	6	
AM_470590	Science Museology	6	
AM_1002	Science in Dialogue	6	
AM_471014	Science Journalism	6	
Total		120 EC	

12.3.2 Specialization Communication in the Health and Life Sciences

General compulsory MSc courses MPA specific compulsory courses Beta-oriented course from other MSc programmes Optional components or Capita Selecta	see 12.3.1 general setup
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Internships and theses (compulsory)			
code	name	EC	
AM_471124	Internship I MPA Communication	30	
AM_471125	Internship II MPA Communication	30	
AM_471126	Thesis MPA	9	
	subtotal	69 EC	

Compulsory courses			
code	name	EC	
AM_470587	Science and Communication	6	
	subtotal	6 EC	

Compulsory courses: at least 6 EC to be obtained			
code	name	EC	
AM_1052	Innovation Behaviour and Economy	3	
AM_470590	Science Museology	6	
AM_1002	Science in Dialogue	6	
AM_471014	Science Journalism	6	

12.3.3 Specialization Health and Life Science-Based Management and Entrepreneurship

General compulsory MSc courses MPA specific compulsory courses Beta-oriented course from other MSc programmes Optional components or Capita Selecta	see 11.3.1 general setup
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Internships and theses (compulsory)			
code	name	EC	
AM_471118	Internship I MPA Management and Entrepreneurship	30	
AM_471119	Internship II MPA Management and Entrepreneurship	30	
AM_471126	Thesis MPA	9	
	subtotal	69 EC	

Compulsory courses			
code	name	EC	
AM_470584	Business Management in Health and Life Sciences	6	
	subtotal	6 EC	

Compulsory courses: at least 6 EC to be obtained			
code	name	EC	
AM_470585	Clinical Development and Clinical Trials	6	
AM_470575	Entrepreneurship in Health and Life Sciences	6	
AM_1052	Innovation Behaviour and Economy	3	
AM_1002	Science in Dialogue	6	
AM_470583	Management of Corporate Social Responsibility	6	

12.3.4 Specialization Health and Life Science-Based Polic

General compulsory MSc courses see 11.3.1 general setup
 MPA specific compulsory courses
 Beta-oriented course from other MSc programmes
 Optional components or Capita Selecta

Internships and theses (compulsory)		
code	name	EC
AM_471122	Internship I MPA Policy	30
AM_471123	Internship II MPA Policy	30
AM_471126	Thesis MPA	9
	subtotal	69 EC
Compulsory courses		
code	name	EC
AM_470589	Policy, Politics and Participation	6
Compulsory courses: at least 6 EC to be obtained		
AM_1052	Innovation Behaviour and Economy	3
AM_470820	International Comparative Analysis of Health Care Systems	6
AM_1002	Science in Dialogue	6

12.3.5 Specialization International Public Health

General compulsory MSc courses see 11.3.1 general setup
 MPA specific compulsory courses
 Beta-oriented course from other MSc programmes
 Optional components or Capita Selecta

Internships and theses (compulsory)		
code	name	EC
AM_471120	Internship I MPA International Public Health	30
AM_471121	Internship II MPA International Public Health	30
AM_471126	Thesis MPA	9
	subtotal	69 EC
Compulsory courses: at least 12 EC to be obtained		
code	name	EC
AM_470585	Containment strategies for infectious diseases in global context	6
AM_470818	Health Globalisation and Human Rights	6
AM_1052	Innovation Behaviour and Economy	3
AM_470588	Disability and Development	6
	subtotal	18 EC
AM_470585	Clinical Development and Clinical Trials	6
AM_470820	International Comparative Analysis of Health Care Systems	6
AM_470127	Management of Corporate Social Responsibility	6

12.4 Deviating from the programme

1. In order to broaden their knowledge students may also take selected subjects and courses from the other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of internship. The student must request this in writing before the 10th week of the internship. The request must be underpinned by reasons related to the work in question.

12.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471116 AM_471124 AM_471118 AM_471122 AM_471120	Internship I MPA Internship I MPA Communication Internship I MPA Management and Entrepreneurship Internship I MPA Policy Internship I MPA International Public Health	registration of at least 18 EC of the master programme concerned, and successful completion of the courses: (1)AM_470582 Qualitative and Quantitative Research Methods (2)AM_470571 Analysis of Governmental Policy (3)AM)470572 Communication, Organisation and Management.
AM_471117 AM_471125 AM_471119 AM_471123 AM_471121	Internship II MPA Internship II MPA Communication Internship II MPA Management and Entrepreneurship Internship II MPA Policy Internship II MPA International Public Health	Students must have successfully completed their first internship and the course module 'Managing Science, Technology and Society.

12.6 Admission to the programme

Admission to the master programme MPA

12.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Article 12.6.2 lists all degrees that provide direct admission or are subject to additional requirements.
12.6.2	Direct admission is provided to the Master's programme in Management, Policy Analysis and Entrepreneurship in the Health and Life sciences for students with a Bachelor of Science degree in, Biomedical Sciences, Health Sciences or Health and Life Sciences from the VU University Amsterdam or Medical Natural Sciences, Medical Informatics, Bio-informatics, Bio-Chemistry or Pharmaceutical Sciences of a Dutch university.
12.6.3	Students with a Bachelor's degree obtained at a Dutch university or institute of higher education, other than listed in Article 12.5.2, will not receive direct admission to the

	programme. However, they may be admitted to the programme on the basis of a decision to that effect taken by the examination board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
12.6.4	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
12.6.5	In all cases other than those specified in Paragraphs 1 to 4, the final decision rests with the admission board.
12.6.6	Students in possession of a degree obtained at an institution outside of the Netherlands, which is equivalent to the required Bachelor's degree, may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.

12.7 Expired programme components

Compared to academic year 2012-2013, no programme components cease to exist within the master programme.

13 NEUROSCIENCES

13.1 Final attainment levels

Final attainment levels for the programme

General information

Master of Neurosciences graduates possess an academic attitude and academic skills. This means that Master's graduates are able to:

- independently acquire information on the field of neurosciences, and to analyse and critically evaluate this information;
- select and order information, to distinguish essentials from trivialities, and to make associations;
- think in multidisciplinary terms, and to possess an understanding of other disciplines (and sub-disciplines) that are important to their own specialism;
- independently and critically analyse research, both in relation to its design and performance, and to the results obtained;
- draw up a research plan, giving details of experimental design, performance and analysis;
- produce a written report and a verbal presentation of the research, in English;
- apply their knowledge of neuroscience to social questions;
- make an intrinsic contribution to scientific discussions relating to planned research or to discussions of research results;
- evaluate their own performance, both introspectively and in conversation with others;
- reflect on the ethical aspects of research or its uses, and include these deliberations in the decision-making process.

Knowledge

- mastery of the field's conceptual framework, understanding of the state of the art in terms of developing theories and insight into the most important current research issues in the neurosciences;
- appreciation of the place of the neurosciences within biology, the biomedical sciences, medicine and psychology;
- familiarity with the most relevant sources of information (and in the use of such sources) in the field of the natural sciences in general and of the neurosciences in particular;
- appreciation of the scientific and social relevance of the neurosciences and of current research in this area.

Skills

- understand and summarize neuroscience literature;
- set up and perform neuroscientific experiments;
- collaborate with researchers from other disciplines;
- familiarity with computer software that is relevant to the field.

13.2 Specializations in MSc Neurosciences

The master's programme does not contain specializations.

13.3 Composition of the programme

13.3.1 General setup MSc Neurosciences

The Master's programme is worth 120 EC. The EC are divided over two years of study, each comprising 60 EC.

Two research placement (25&27 EC)	In total 52 EC
Thesis based on literature study	8 EC
compulsory courses	36 EC
Optional courses	24 EC

13.3.2 Compulsory courses MSc Neurosciences

The Master's examination programme consists of the following compulsory components, with the study load for each component given in EC. This applies to all first year students who register for a Master's programme for the first time in 2013-2014.

code	name	EC	year
AM_471108	Internship Neurosciences I*	25 or 27	Year one
AM_471109	Internship Neurosciences II*	25 or 27	Year two
AM_471110	Literature Survey Neurosciences**	8	Year two
AM_471023	Scientific Writing in English	3	Year one
AM_1006	Behavioral Genetics	6	Year one
AM_1005	Clinical Neuroscience	6	Year one
AM_1004	Molecule to mind	12	Year one
AM_1007	Neurogenomics	6	Year one
AM_1018	Neurophilosophy and Ethics	3	Year two

* The placements must comply with the following conditions:

- The placements (AM_471108 and AM_471109) are worth a total of 52 EC: these may consist either of two placements of equal duration, or one long one and one shorter one.
- Both placements must be carried out in a research laboratory which is recognized by the examination board. One of the placements may be completed outside the VU/Vumc.
One of the placements must deal with a purely neuroscience topic while the other can be in a field that is related to neuroscience research.
- The choice of placements has to be submitted to the examination board for approval.

Both placements must contain the following elements:

- Theoretical enhancement of the neuroscience field in question
- Fleshing out, performing and analysing the research assignment
- Formulating conclusions and recommendations
- Producing written report in English
- Presenting verbal report in English

**	The literature study must comply with the following conditions:
	- The literature study must lead to a thesis or a research proposal (8 EC).
	- Although it is supervised by a member of the teaching staff, the literature

	study must be carried out largely independently. Working within the limitations governing this section of the programme, the student must be able to efficiently absorb and critically evaluate the literature in a given sub-field. Taking this study as a basis, he or she will be able to clearly indicate the current state of affairs in the sub-field in question. In addition, the student will be able to point out limitations and problems, formulate recommendations for further research and indicate problem-solving strategies, dependent on the context of the research.
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13.3.3 Optional components second year

Students are free to earn their 24 EC for optional study by taking courses within the Master's programme of Neurosciences. The following optional courses will be offered in 2013-2014.

code	name	EC
AM_1014	Advanced Clinical Neurosciences	6
AM_1003	Advanced Human Neurophysiology	6
AM_470717	Advanced Neurogenomics	6
AM_470733	Complex Trait Genetics	6
AM_470713	Developmental Neurobiology of the Vertebrate Brain	6
AM_470700	Experimental and Clinical Neuroendocrinology	6
AM_470715	Functional Brain Imaging	6
AM_470729	Gene Hunting	6
AM_1008	Genomic Data Analysis	6
AM_470726	Live Cell Imaging	6
AM_470718	Neuro- and Psychopharmacology	6
AM_1001	Neuronal Networks In Vivo	6
AM_471018	Neurobiology of Animal Behavior	6
AM_470728	Methods in Behavioral Neuroscience	6
AM_470736	Psychophysiology	6
AM_1040	Statistical Genetics for Gene Finding	6
AM_1009	Synaptic and Cellular Neurophysiology	6
AM_470712	System Neurosciences	6
AM_470733	Complex Trait Genetics	6

13.4 Deviating from the programme

1. With regard to optional courses, students may also take selected subjects and courses from other Master's programmes. In all cases, these options have to be submitted to the examination board for approval.
2. The examination board can, to a limited extent (no more than 6 EC), grant the student permission to use the time that is normally reserved for optional studies to extend a period of placement. The student must request this in writing before the end of the research internship. The request must be underpinned by reasons related to the work in question. The examination board can also, to a limited extent (no more than 20 EC), grant the student permission to use the time that is normally allocated to placement for optional studies. This should also be requested in writing.

13.5 Sequence of examinations

Participation in the components listed below is only possible if the admission requirements have been met.

code	subject	entry requirements
AM_471108 AM_471109	Internship Neurosciences I Internship Neurosciences II	registration of at least 18 EC of the master programme concerned
AM_470733	Complex Trait Genetics	AM_1006 Behavioural Genetics

13.6 Admission to the programme

Admission to the master programme Neurosciences

13.6.1	Students with a Bachelor of Science degree from a Dutch university are eligible for admission to the Master's programme. Admission to the master programme is subject to additional requirements. Article 13.6.2 lists the additional requirements for admittance.
13.6.2	Admission to the Master's programme in Neurosciences is provided to students with a Bachelor's degree in Biology, Biomedical Sciences, Health and Life (Gezondheid en Leven) or a Bachelor's degree in Psychology, with a Biological Psychology or Neuropsychology profile, from a Dutch university. In addition to having a Bachelor's degree, applicants have to meet a number of entrance requirements: <ul style="list-style-type: none"> • two letters of references, provided by qualified persons, e.g. supervisors of bachelor thesis or coordinators of major bachelor courses; • a letter of motivation stating clearly why the applicant wants to specifically enrol into the Master's programme in Neurosciences at the VU University Amsterdam. <p>Final decision for admission to the first year of VU Master of Neuroscience program will be made based on the evaluation of the admission documents in combination with a judgment of the student's motivation revealed by an interview.</p>
13.6.3	Students in possession of an equivalent degree obtained at an institution outside of the Netherlands may be admitted to the programme on the basis of a decision to that effect taken by the admission board of the Master's programme. The admission board may make additional demands of the student before granting admission to the Master's programme.
13.6.4	In all cases other than those specified in Paragraphs 1 to 3, the final decision rests with the admission board.

13.7 Expired programme components

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2013-2014.

code	Name	EC	In 2012-2013 part of:	2013-2014
AM_470734	Statistical Genetics for Gene Finding	5	Optional components	Replaced by AM_1040, 6 EC, same name