

# Programme-specific part of the Education and Examination Regulations 2023-2024

## Graduate School of Geosciences: Master's degree programme in Earth Sciences

The Master's degree programme *Earth Sciences* offers the programmes *Earth, Life and Climate*, *Earth Structure and Dynamics*, *Earth Surface and Water* and *Marine Sciences*.

### Art. 2.1 – Admission requirements

1. The following conditions for admission apply:

Admission to the programme *Earth, Life and Climate* is granted to students with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight and skills at university Bachelor's level. Furthermore, students need to prove that they have gained the following specific knowledge, insight and skills:

- a) knowledge in the field of *Earth Sciences*, *Biology* or *Chemistry*, at the advanced level of the major *Earth Sciences*, *Biology* or *Chemistry* at Utrecht University, or equivalent to this level.
- b) insight into *Earth Sciences* at the advanced level of the major *Earth Sciences*, *Biology* or *Chemistry* at Utrecht University, or equivalent to this level.
- c) academic and research skills at the advanced level of the major *Earth Sciences*, *Biology* or *Chemistry* at Utrecht University, or equivalent to this level.

Admission to the programme *Earth Structure and Dynamics* is granted to students with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight and skills at university Bachelor's level. Furthermore, students need to prove that they have gained the following specific knowledge, insight and skills:

- a) knowledge in the field of *Earth Sciences* or *Physics*, at the advanced level of the major *Earth Sciences* or *Physics* at Utrecht University, or equivalent to this level.
- b) insight into *Earth Sciences* at the advanced level of the major *Earth Sciences* or *Physics* at Utrecht University, or equivalent to this level.
- c) academic and research skills at the advanced level of the major *Earth Sciences* or *Physics* at Utrecht University, or equivalent to this level.

Admission to the programme *Earth Surface and Water* is granted to students with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight and skills at university Bachelor's level. Furthermore, students need to prove that they have gained the following specific knowledge, insight and skills:

- a) knowledge in the field of *Earth Sciences*, at the advanced level of the major *Earth Sciences* at Utrecht University, or equivalent to this level.
- b) insight into *Earth Sciences* at the advanced level of the major *Earth Sciences* at Utrecht University, or equivalent to this level.
- c) academic and research skills at the advanced level of the major *Earth Sciences* at Utrecht University, or equivalent to this level.

Admission to the programme *Marine Sciences* is granted to students with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight and skills at university Bachelor's level. Furthermore, students need to prove that they have gained the following specific knowledge, insight and skills:

- a) knowledge in the field of *Earth Sciences* or *Biology*, at the advanced level of the major *Earth Sciences* or *Biology* at Utrecht University, or equivalent to this level.
  - b) insight into *Earth Sciences* or *Biology* at the advanced level of the major *Earth Sciences* or *Biology* at Utrecht University, or equivalent to this level.
  - c) academic and research skills at the advanced level of the major *Earth Sciences* or *Biology* at Utrecht University, or equivalent to this level.
2. Students will be selected based on objective standards regarding:
- a) their previous academic performance in a relevant subject area or areas
  - b) relevant skills
  - c) their command of the language or languages used in the programme
  - d) the following additional selection criteria with proven relevance for the opinion on the suitability of the candidate:
    - motivation
    - average grade

This information is used to consider whether students concerned will be able to complete the Master's Programme successfully within the set time period.

The admission requirements have been formulated clearly and transparently so that candidates know in advance which requirements must be met in order to qualify for selection.

### **Art. 3.1 – Aim of the degree programme**

The programme aims to:

1. equip students with specialist knowledge, skills and understanding in the field of *Earth Sciences*, and to help them achieve the exit qualifications referred to in part 2 of this article
2. prepare students for a career in one or more sub-fields of *Earth Sciences*
3. prepare students for enrolling in a programme to train as a researcher in the field of *Earth Sciences*

Graduates in *Earth Sciences*:

1. have advanced knowledge of the field
2. can develop and apply (partly) original ideas in a research context;
3. can apply their knowledge and understanding, as well as their problem-solving skills in broader contexts related to the field
4. can integrate, interpolate and extrapolate knowledge at a high level, including knowledge gathered from research articles
5. show professional and critical attitude towards social, environmental and ethical aspects of the knowledge acquired and the competencies gained
6. have obtained expertise in the field of understanding, modelling and simulation of key underlying processes in the field of study
7. have developed general listening, writing and presentation skills, also geared towards non-specialist audiences
8. have developed group, team and interpersonal skills, and demonstrate skills necessary for pursuing advanced research.

More programme-specific qualifications are listed in the prospectuses of the different programmes.

### **Art. 3.6 – Composition of the programmes**

Appendix 1 specifies the composition of the programmes.

### **Art. 4.2 – Course admission requirements**

The Executive Board decides the order in which the required components of a Master's degree programme must be completed. This will also be published in the prospectus and in the University course catalogue.

GEO4-1500	30 EC of theoretical first year MSc courses (GEO4-... ) of relevant MSc programme.
GEO4-1520	30 EC of theoretical first year MSc courses (GEO4-... ) of relevant MSc programme.
GEO4-1521	30 EC of theoretical first year MSc courses (GEO4-... ) of relevant MSc programme.

**Art. 4.7 – Evaluation of quality of the education**

1. The Director of Education monitors the quality of education, and ensures that both the courses and the curriculum are evaluated. The Director takes into consideration the advice and suggestions given by the Education Committee regarding improving and ensuring the quality of the programme.
2. Students are informed of the outcomes of the course and curriculum evaluations.

## Appendix 1: composition of the programmes

### Earth, Life and Climate

Theoretical courses: required electives	45 EC
MSc research/thesis	30-45 EC
Individual programme/internship Compulsory second report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0- 45 EC

PROGRAMME	EARTH, LIFE AND CLIMATE			
<b>PROGRAMME-WIDE COURSES</b> At least <u>one</u> from each block	<b>Earth, Life and Climate:</b> GEO4-1412 Astronomical climate forcing and time scales; GEO4-1440 Microbes and biogeochemistry			
	<b>Research Instruction Earth, Life and Climate:</b> Field research instruction Geology (GEO4-1430) or Field research instruction Geochemistry (GEO4-1431) or Master excursion Earth Surface and Water (GEO4-4418) or Ice-ocean-climate interactions (GEO4-1454), plus seminars and career development activities			
<b>Recommended study path</b>	<b>Integrated stratigraphy and sedimentary systems</b>	<b>Climate reconstruction</b>	<b>Biogeosciences and evolution</b>	<b>Biogeochemistry</b>
At least <u>four</u> courses from the complete offer of the programme	GEO4-1405 Paleoceanography and climate variability	GEO4-1405 Paleoceanography and climate variability	GEO4-1419 Dynamics of sedimentary systems	GEO4-1417 Advanced mineralogy: minerals as materials
	GEO4-1418 Dynamics of basins and orogens	GEO4-1419 Dynamics of sedimentary systems	GEO4-1420 Organic geochemistry	GEO4-1420 Organic geochemistry
	GEO4-1419 Dynamics of sedimentary systems	GEO4-1420 Organic geochemistry	GEO4-1422 Reconstructing extreme climate transitions	GEO4-1421 Reactive transport in the hydrosphere
	GEO4-1438 Paleomagnetism	GEO4-4409 Reconstructing Quaternary environments	GEO4-1439 Aquatic and environmental geochemistry	GEO4-1443 Stable isotopes in Earth Sciences
	GEO4-4436 Fluvial systems	GEO4-4423 Hydrology climate change and cryosphere	GEO4-1514B Vertebrate evolution (tetrapods)	GEO4-1439 Aquatic and environmental geochemistry
0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme	0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme			
<b>Professional profile</b>	Geologist Biogeologist Sedimentologist Stratigrapher	Geologist Biogeologist Sedimentologist Paleoclimatologist	Geologist Biogeologist Sedimentologist Paleontologist	Geochemist

## Earth Structure and Dynamics

Theoretical courses: required electives	45 EC
MSc research/thesis	30-45 EC
Individual programme/internship Compulsory second report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0- 45 EC

PROGRAMME	EARTH STRUCTURE AND DYNAMICS		
<b>PROGRAMME-WIDE COURSES</b> At least <u>one</u> from each block	<b>Earth Structure and Dynamics:</b> Structure and composition of the Earth's interior (GEO4-1401); Structural analysis of deformed rocks (GEO4-1411); Paleomagnetism (GEO4-1438)		
	<b>Research instruction Earth Structure and Dynamics:</b> Applied geophysics (GEO4-1424a) or Field research instruction geology (GEO4-1430), plus seminars and career development activities		
<b>Recommended study path</b>	<b>Physics of the solid earth and planets</b>	<b>Basins, orogens and the crust-lithosphere system</b>	<b>Earth materials</b>
At least <u>four</u> courses from the complete offer of the programme	GEO4-1408 Theoretical seismology	GEO4-1409 Tectonophysics	GEO4-1403 Petrological and geochemical evolution of the Earth
	GEO4-1409 Tectonophysics	GEO4-1416 Dynamics of the Earth's mantle	GEO4-1410 Mechanisms of deformation and transport in rocks
	GEO4-1415 Data processing and inverse theory	GEO4-1418 Dynamics of basins and orogens	GEO4-1417 Advanced mineralogy: minerals as materials
	GEO4-1416 Dynamics of the Earth's mantle	GEO4-1419 Dynamics of sedimentary systems	GEO4-1443 Stable isotopes in Earth Sciences
	GEO4-1427 Computational geophysics	GEO4-1442 Modelling of crust and lithosphere deformation	GEO4-1435 Advanced petrology: from microscopic properties to geological processes
0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme	0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme		
<b>Professional profile</b>	Geophysicist	Geophysicist Geologist	Geologist

## Earth Surface and Water

Theoretical courses: required electives	45 EC
MSc research/thesis	30-45 EC
Individual programme/internship Compulsory second report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0-45 EC

<b>PROGRAMME-WIDE COURSES</b> At least <u>one</u> from each block	<b>Earth Surface and Water:</b> Principles of groundwater flow (GEO4-1434); Statistics and data analysis in Physical Geography (GEO4-4412); Advanced GIS for geoscientists (GEO4-4433)			
	<b>Research Instruction Earth Surface and Water:</b> Field research instruction Geochemistry (GEO4-1431) or Environmental hydrogeology (GEO4-1432) or Master's excursion Earth Surface and Water (GEO4-4418) or Hydrology and climate (GEO4-4423), plus seminars and career development activities			
<b>Recommended study path</b>	<b>Environmental geochemistry</b>	<b>Hydrology</b>	<b>Coastal dynamics and fluvial systems</b>	<b>Geohazards and earth observation systems</b>
At least <u>four</u> courses from the complete offer of the programme	GEO4-1421 Reactive transport	GEO4-1421 Reactive transport	GEO4-4403 Coastal zone and river management	GEO4-4404 Land surface hydrology
	GEO4-1443 Stable isotopes in Earth Sciences (new course)	GEO4-1433 Hydrogeological transport phenomena	GEO4-4409 Reconstructing Quaternary environments	GEO4-4406 Land surface process modelling
	GEO4-1433 Hydrogeological transport phenomena	GEO4-4404 Land surface hydrology	GEO4-4434 Morphodynamics of wave-dominated coasts	GEO4-4408 Remote sensing
	GEO4-1439 Aquatic and environmental geochemistry	GEO4-4406 Land surface process modelling	GEO4-4435 Morphodynamics of tidal systems	GEO4-4417 Unsaturated zone hydrology
	GEO4-6001 Quantitative water management	GEO4-4417 Unsaturated zone hydrology	GEO4-4436 River and delta systems	GEO4-4425 Hazards and risk assessment
0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme	0 to 2 courses from all programmes in the <i>Earth Sciences</i> Master's programme			
<b>Professional profile</b>	Geochemist	Hydrologist	Physical geographer Specialist in morphodynamics	Physical geographer Specialist in geohazards / remote sensing

## Marine Sciences

Theoretical courses	45 EC
Elective courses	15-30 EC
MSc research/thesis	30-45 EC
Individual programme/internship Compulsory second report	15-30 EC

<b>Marine Sciences</b>	Compulsory	GEO4-1451 Introduction to Marine Sciences GEO4-1452 Ocean Law and Policy
At least <u>one</u> course from different core disciplines	Physics	GEO4-1453 Introduction to Physical oceanography NS-MO401M* Dynamical oceanography NS-MO447M* Wave attractors (old: Ocean waves) NS-MO502M* Making, analysing and interpreting observations NS-MO503M* Earth system modelling
	Earth Sciences	GEO4-1405 Paleo oceanography & climate variability GEO4-1412 Astronomical climate forcing & time scales GEO4-1419 Dynamics of sedimentary systems GEO4-1422 Reconstructing extreme climate transitions GEO4-1454 Ice-ocean-climate interactions GEO4-4434 Morphodynamics of wave-dominated coasts GEO4-4435 Morphodynamics of tidal systems
	Chemistry	GEO4-1420 Organic geochemistry GEO4-1421 Reactive transport GEO4-1443 Stable isotopes in Earth Sciences GEO4-1431 Field research instruction geochemistry GEO4-1439 Aquatic and environmental geochemistry
	Biology	GEO4-1440 Microbes and biogeochemistry GEO4-1450 Coastal ecology