

## Programme-specific part of the Education and Examination Regulations 2024-2025

### 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 candidates with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight, and skills at university Bachelor's level. Furthermore, candidates 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 candidates with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight, and skills at university Bachelor's level. Furthermore, candidates 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 candidates with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight, and skills at university Bachelor's level. Furthermore, candidates 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 candidates with a Dutch or a foreign diploma confirming that they have acquired the knowledge, insight, and skills at university Bachelor's level. Furthermore, candidates 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 assessment of 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.

**Met opmerkingen [HP1]:** Ik vind niet dat de transmission requirements "are clearly and transparently formulated" als je niet weet wat inhoud/niveau van de BSc AW is. Dat is voor een buitenlandse student nauwelijks na te gaan (met mogelijke gevolgen van dien voor de student en de MSc docenten).

**Met opmerkingen [Mv2R1]:** Hier hoeft niets te worden veranderd: de admission requirements staan uitgespeld op de studiekeuzerswebsite als de studenten zich aanmelden.

The following course admission requirements with regards to the Internship (GEO4-1500), Graduation Research - MSc Earth Sciences (GEO4-1520), Guided Research (GEO4-1521) apply:

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

**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<br>Compulsory second report | 15 - 30 EC |
| Additional elective courses                                 | 0 - 30 EC  |

| PROGRAMME  | EARTH, LIFE, AND CLIMATE   |  |  |   |
|--|--|--|--|---|
| <b>PROGRAMME-WIDE COURSES</b><br>At least one 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.<br>* Please note: Students are only allowed one MSc fieldwork / excursion (GEO4-1430; 1431; 4418) during their MSc training. |  |  |   |
| <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              | GEO4-1418<br>Dynamics of basins and orogens  | GEO4-1405<br>Paleoceanography and climate variability              | GEO4-1419<br>Dynamics of sedimentary systems                   | GEO4-1417<br>Advanced mineralogy: minerals as materials |
| GEO4-1438<br>Paleomagnetism  | GEO4-1419<br>Dynamics of sedimentary systems   | GEO4-1443<br>Stable isotopes in Earth Sciences                     | GEO4-1420<br>Organic geochemistry                              | GEO4-1420<br>Organic geochemistry                       |
|  | GEO4-1438<br>Paleomagnetism  | GEO4-1453<br>Oceans and Sea level (new name)                       | GEO4-1422<br>Reconstructing extreme climate transitions        | GEO4-1421<br>Reactive transport in the hydrosphere      |
|  | GEO4-1517a<br>Applied Stratigraphy and subsurface basin analysis   | GEO4-4409<br>Reconstructing Quaternary environments                | GEO4-1439<br>Aquatic and environmental geochemistry            | GEO4-1443<br>Stable isotopes in Earth Sciences          |
|  | GEO4-4436<br>River and delta systems   | GEO4-4423<br>Hydrology climate change and cryosphere               | GEO4-1514B<br>Vertebrate evolution (tetrapods)                 | GEO4-1439<br>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<br>Biogeologist<br>Sedimentologist<br>Stratigrapher  | Geologist<br>Biogeologist<br>Sedimentologist<br>Paleoclimatologist | Geologist<br>Biogeologist<br>Sedimentologist<br>Paleontologist | Geochemist  |

## Earth Structure and Dynamics

|   |            |
|---|------------|
| Theoretical courses: required electives                     | 45 EC      |
| MSc research/thesis   | 30 - 45 EC |
| Individual programme/internship<br>Compulsory second report | 15 - 30 EC |
| Additional elective courses                                 | 0 - 30 EC  |

| PROGRAMME  | EARTH STRUCTURE AND DYNAMICS  |   |  |
|--|---|---|--|
| <b>PROGRAMME-WIDE COURSES</b><br>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.<br>* Please note: Students are only allowed one MSc fieldwork / excursion (GEO4-1430; 1431; 4418) during their MSc training. |   |  |
| <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 <sup>†</sup> | GEO4-1408<br>Theoretical seismology   | GEO4-1409<br>Tectonophysics                                 | GEO4-1403<br>Petrological and geochemical evolution of the Earth                     |
|  | GEO4-1409<br>Tectonophysics   | GEO4-1416<br>Dynamics of the Earth's mantle                 | GEO4-1410<br>Mechanisms of deformation and transport in rocks                        |
|  | GEO4-1415<br>Data processing and inverse theory   | GEO4-1418<br>Dynamics of basins and orogens                 | GEO4-1417<br>Advanced mineralogy: minerals as materials                              |
|  | GEO4-1416<br>Dynamics of the Earth's mantle   | GEO4-1419<br>Dynamics of sedimentary systems                | GEO4-1443<br>Stable isotopes in Earth Sciences                                       |
|  | GEO4-1427<br>Computational geophysics   | GEO4-1442<br>Modelling of crust and lithosphere deformation | GEO4-1435<br>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<br>Geologist                                   | Geologist  |

<sup>†</sup> The courses GEO4-1441 (Reflection seismics & Georesources) en GEO4-1517A (Applied Stratigraphy and Subsurface Basin Analysis) are also considered to be part of the offer of the Earth Structure and Dynamics program.

## Earth Surface and Water

|   |            |
|---|------------|
| Theoretical courses: required electives                     | 45 EC      |
| MSc research/thesis   | 30 - 45 EC |
| Individual programme/internship<br>Compulsory second report | 15 - 30 EC |
| Additional elective courses                                 | 0 - 30 EC  |

|  |  |  |  |  |
|--|--|--|--|--|
| <b>PROGRAMME-WIDE COURSES</b><br>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.<br>* Please note: Students are only allowed one MSc fieldwork / excursion (GEO4-1430; 1431; 4418) during their MSc training. |  |  |  |
| <b>Recommended study path</b>  | <b>Environmental geochemistry</b>  | <b>Hydrology</b>                                 | <b>Coastal dynamics and fluvial systems</b>          | <b>Geohazards and earth observation</b>                          |
| At least <u>four</u> courses from the complete offer of the programme              | GEO4-1421<br>Reactive transport  | GEO4-1421<br>Reactive transport                  | GEO4-4403<br>Coastal zone and river management       | GEO4-4404<br>Land surface hydrology                              |
|  | GEO4-1443<br>Stable isotopes in Earth Sciences   | GEO4-1433<br>Hydrogeological transport phenomena | GEO4-4409<br>Reconstructing Quaternary environments  | GEO4-4406<br>Land surface process modelling                      |
|  | GEO4-1433<br>Hydrogeological transport phenomena   | GEO4-4404<br>Land surface hydrology              | GEO4-4434<br>Morphodynamics of wave-dominated coasts | GEO4-4408<br>Remote sensing                                      |
|  | GEO4-1439<br>Aquatic and environmental geochemistry  | GEO4-4406<br>Land surface process modelling      | GEO4-4435<br>Morphodynamics of tidal systems         | GEO4-4417<br>Unsaturated zone hydrology                          |
|  | GEO4-6001<br>Quantitative water management   | GEO4-4417<br>Unsaturated zone hydrology          | GEO4-4436<br>River and delta systems                 | GEO4-4425<br>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<br>Specialist in morphodynamics  | Physical geographer<br>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<br>Compulsory second report | 15 - 30 EC |

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