Programme-specific part of the Education and Examination Regulations 2019-2020
Master’s degree programme in Earth Sciences
Graduate School of Geosciences

The master’s degree programme Earth Sciences offers the programmes Earth Life and Climate, Earth Structure and Dynamics, Earth Surface and Water, Marine Sciences and Water Science and Management.¹

art. 2.1 – requirements for admission to the degree programme

1. The following conditions for admission apply to the programmes that are subsidiary to the degree programme:

Earth, Life and Climate
Admission to the programme Earth, Life and Climate is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor’s level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences, Biology or Chemistry, at advanced level of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.

b) insight in Earth Sciences at advanced level of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.

c) academic and research skills of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.

Earth Structure and Dynamics
Admission to the programme Earth Structure and Dynamics is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor’s level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences or Physics, at advanced level of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.

b) insight in Earth Sciences at advanced level of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.

c) academic and research skills of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.

Earth Surface and Water
Admission to the programme Earth Surface and Water is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills on a university Bachelor’s level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences, at advanced level of the major Earth Sciences at Utrecht University, or equivalent to that level.

b) insight in Earth Sciences at advanced level of the major Earth Sciences at Utrecht University, or equivalent to that level.

c) academic and research skills of the major Earth Sciences at Utrecht University, or equivalent to that level.

¹ The Water Science and Management programme is open for re-enrollment only until 31 August 2020.
**Marine Sciences**

Admission to the programme Marine Sciences is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor’s level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

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

2. Students will be selected on the basis of objective standards concerning:
   - a) previous academic performance in a relevant subject area or areas;
   - b) relevant skills;
   - c) command of the language(s) used in the programme.

This information is used to consider whether the student concerned is able to complete the Master’s Programme successfully within the nominal time period.

The admission requirements have been formulated clearly and transparently so that candidates are aware beforehand of the requirements they must meet 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 help them achieve the exit qualifications referred to part 2 of this article;
2. prepare students for a career in one or more sub-fields of Earth Sciences;
3. prepare students for undertaking a programme to train as a researcher in the field of Earth Sciences.

The graduate in Earth Sciences
1. has advanced knowledge in the field of the programme;
2. is able to think/develop/apply (partly) original ideas in a (semi) research context;
3. is able to apply knowledge and understanding, and problem solving abilities within broader contexts related to the field of the programme;
4. has obtained the ability to integrate / interpolate / extrapolate (incomplete) knowledge at a high level including those gathered from research-articles; shows professional and critical attitude towards social / environmental / ethical aspects of the knowledge acquired and the competencies gained;
5. has obtained expertise in the field of understanding / modelling / simulation of key underlying processes in the field of study;
6. has developed general listening / writing / presentation skills, also for non-specialist audiences;
7. has developed group / team / interpersonal skills, and demonstrates skills for pursuing advanced research.

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

**art. 3.6 – composition of the programmes**

The composition of the programmes is specified in appendix 1.

**art. 4.2 – entry requirements of courses**

The Executive Board will decide the order in which the required components of a Master’s degree programme must be completed. This will be announced in the prospectus and in the University Course catalogue.
The Director of Education is responsible for monitoring the quality of education. To this end, the Director ensures that courses are evaluated as well as the curriculum. The Director takes the advice and suggestions given by the Education Committee on improving and ensuring the quality of the programme into consideration.

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 2nd report | up to 30 EC |
| Additional theoretical courses, seminar modules, advanced-level courses | 0- 45 EC |

**Programme: Earth, Life and Climate**
- At least 1 from each block
- **Research Instruction Earth, Life and Climate:** GEO4-1430 Field research instruction Geology or GEO4-1431 Field research instruction Geochemistry or GEO4-1441 Master excursion Earth Surface and Water or GEO4-1432 Environmental Hydrogeology > plus seminars and career development activities

**Recommended study path**

| Integrated stratigraphy and sedimentary systems | Climate reconstruction | Biogeosciences and evolution | Biogeochemistry |
| GEO4-1405 Paleoceanography and climate variability | GEO4-1405 Paleoceanography and climate variability | GEO4-1419 Dynamics of sedimentary systems | GEO4-1417 Earth materials: From atoms to planets |
| 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 Evolutionary paleobiology and proxies | GEO4-1421 Reactive transport in the hydrosphere |
| GEO4-1438 Paleomagnetism | GEO4-4409 Reconstructing Quaternary environments | GEO4-1439 Aquatic and environmental geochemistry | GEO4-1426 Kinetic processes |
| 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 master’s Earth Sciences

**Professional profile**
- 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 | up to 30 EC |
| Compulsory 2nd report | |
| Additional theoretical courses, seminar modules, advanced-level courses | 0-45 EC |

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>EARTH STRUCTURE AND DYNAMICS</th>
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</thead>
<tbody>
<tr>
<td><strong>PROGRAMME-BROAD COURSES</strong> At least 1 from each block</td>
<td><strong>Earth Structure and Dynamics</strong>: GEO4-1401 Structure and composition of the Earth's interior; GEO4-1411 Structural analysis of deformed rocks; GEO4-1438 Paleomagnetism</td>
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<tr>
<td><strong>Research instruction Earth Structure and Dynamics</strong>: &lt; GEO4-1424a Applied geophysics or GEO4-1430 Field research instruction geology &gt; plus seminars and career development activities</td>
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<thead>
<tr>
<th>Recommended study path</th>
<th>Physics of the solid earth and planets</th>
<th>Basins, orogens and the crust-lithosphere system</th>
<th>Earth materials</th>
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<tbody>
<tr>
<td>At least 4 courses from the complete offer of the programme</td>
<td>GEO4-1408 Theoretical seismology</td>
<td>GEO4-1409 Tectonophysics</td>
<td>GEO4-1403 Petrological and Geochemical Evolution of the Earth</td>
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<tr>
<td>GEO4-1409 Tectonophysics</td>
<td>GEO4-1416 Dynamics of the Earth’s mantle</td>
<td>GEO4-1410 Mechanisms of deformation and transport in rocks</td>
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<tr>
<td>GEO4-1415 Data processing and inverse theory</td>
<td>GEO4-1418 Dynamics of basins and orogens</td>
<td>GEO4-1417 Earth materials: From atoms to planets</td>
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<tr>
<td>GEO4-1416 Dynamics of the Earth’s mantle</td>
<td>GEO4-1419 Dynamics of sedimentary systems</td>
<td>GEO4-1426 Kinetic processes</td>
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<tr>
<td>GEO4-1427 Computational geophysics</td>
<td>GEO4-1442 Modelling of crust and lithosphere deformation</td>
<td>GEO4-1435 Advanced mineralogy &amp; petrology</td>
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</table>

| 0 to 2 courses from all programmes in the master's Earth Sciences | 0 to 2 courses from all programmes in the master's Earth Sciences |

**Professional profile**

- Geophysicist
- Geologist
- Geologist
**Earth Surface and Water**

<table>
<thead>
<tr>
<th>Theoretical courses: required electives</th>
<th>45 EC</th>
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<tbody>
<tr>
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<td>Additional theoretical courses, seminar modules, advanced-level courses</td>
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</tbody>
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**PROGRAMME-BROAD COURSES**  
At least 1 from each block

**Earth Surface and Water:** GEO4-1434 Principles of groundwater flow; GEO4-4412 Statistics and data analysis in Physical Geography; GEO4-4433 Advanced GIS for geoscientists

**Research Instruction Earth Surface and Water:** GEO4-1431 Field research  
Instruction Geochemistry or GEO4-1432 Environmental hydrogeology or GEO4-4418 Master excursion Earth Surface and Water or GEO4-4423 Hydrology and climate >  
plus seminars and career development activities

**Recommended study path**  
- **Environmental geochemistry**
  - GEO4-1421 Reactive transport
  - GEO4-1426 Kinetic processes
  - GEO4-1433 Hydrogeological transport phenomena
  - GEO4-1439 Aquatic and environmental geochemistry
  - GEO4-6001 Quantitative Water Management

- **Hydrology**
  - GEO4-1421 Reactive transport
  - GEO4-1433 Hydrogeological transport phenomena
  - GEO4-4404 Land surface hydrology
  - GEO4-4417 Unsaturated zone hydrology
  - GEO4-4420 Stochastic hydrology

- **Coastal dynamics and fluvial systems**
  - GEO4-4403 Managing future deltas
  - GEO4-4409 Reconstructing Quaternary environments
  - GEO4-4434 Morphodynamics of wave-dominated coasts

- **Geohazards and earth observation**
  - GEO4-4404 Land surface hydrology
  - GEO4-4406 Land surface process modelling
  - GEO4-4408 Remote sensing
  - GEO4-4420 Stochastic hydrology
  - GEO4-4425 Hazards and risk assessment

0 to 2 courses from all programmes in the master’s Earth Sciences

**Professional profile**  
- **Geochemist**
- **Hydrologist**
- **Physical geographer**
- **Specialist morphodynamics**
- **Physical geographer**
- **Specialist geohazards/remote sensing**
## Marine Sciences

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<td>15-30 EC</td>
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</tbody>
</table>

### Compulsory Courses

- GEO4-1451 Introduction to Marine Sciences
- GEO4-1452 Ocean Law and Policy

### At least 1 course from different core disciplines

- **Physics**
  - GEO4-1453 Introduction to Physical oceanography
  - NS-MO501M* Simulation of the ocean, atmosphere and climate
  - NS-MO502M* Making, analyzing and interpreting observations
  - NS-MO401M* Dynamical oceanography
  - NS-MO428M* Ocean waves (bi-annual)

- **Earth Sciences**
  - GEO4-1405 Paleo oceanography & climate variability
  - GEO4-1412 Astronomical climate forcing & time scales
  - GEO4-1419 Dynamics of sedimentary systems
  - GEO4-1422 Evolutionary paleobiology and proxies
  - GEO4-4434 Morphodynamics of wave-dominated coasts
  - GEO4-4435 Morphodynamics of tidal systems

- **Chemistry**
  - GEO4-1420 Organic geochemistry
  - GEO4-1421 Reactive transport
  - GEO4-1426 Kinetic processes
  - GEO4-1431 Field research instruction Geochemistry
  - GEO4-1439 Aquatic and environmental geochemistry

- **Biology**
  - GEO4-1440 Microbes and biogeochemistry
  - GEO4-1450 Coastal Ecology