Programme syllabus

Master's Programme, Environmental Engineering and Sustainable Infrastructure, 120 credits
Masterprogram, miljöteknik och hållbar infrastruktur
120.0 credits

Valid for students admitted to the education from autumn 20 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

The information is valid for students who started the programme academic year 2020/2021. Later decisions may affect year 2 in the programme. Please look at www.kth.se/studies?l=en_UK for further information.

Knowledge and understanding

After completion of the Master of Science programme in Environmental Engineering and Sustainable Infrastructure the student should:

- have knowledge of theoretical foundations and current research in the areas relevant to Environmental Engineering and Sustainable Infrastructure;
- have knowledge of the processes that affect the environment in the context of infrastructure projects and other human activities;
- have knowledge of those involved in these processes and on the methods used to accurately assess the environmental impact of various projects;
- have a thorough knowledge of tools and methods that can be used to analyze the environmental status of soils and waters.

Skills and abilities

After completion of the Master of Science programme in Environmental Engineering and Sustainable Infrastructure the student should:

- be able to conduct qualified research on current issues, opportunities and future needs and thereby contribute to the development of knowledge in the field;
• perform advanced development work and act as expert in the relevant areas of the construction sector;
• apply skills of mathematical modeling, systems analysis and other scientific methods to simulate and assess the state of the environment;
• apply computer-based tools to solve problems relevant to the field of environmental engineering and sustainable infrastructure;
• carry out assessments of the environmental effects of human actions according to international practice;
• communicate research and findings in an easy-to-understand manner.

Ability to make judgements and adopt a standpoint

After completion of the Master of Science programme in Environmental Engineering and Sustainable Infrastructure the student should:

• be able to discern the normative values that form the basis for different views on sustainable infrastructure;
• reflect on what is a scientific approach in various controversial environmental issues (e.g., climate, pollution from the energy sector);
• reflect on the causes of, and possible techniques to solve, newly discovered environmental problems.

Extent and content of the programme

The programme consists of 120 ECTS credits which correspond to two years full time studies. All courses in the programme are at advanced (second) level. The language of instruction is English.

The programme has no tracks.

Eligibility and selection

The general admission requirement for masters programmes at KTH is a completed Bachelor's degree, equivalent to a Swedish Bachelor's degree (180 ECTS credits), or equivalent. In addition, students have to meet following specific requirements:

Bachelor's degree in the field of civil engineering, environmental engineering, or another subject with clear relevance to the program, of 180 higher education credits.

Furthermore, two of the following prerequisite backgrounds (A-D) shall be met:

A) Fluid Mechanics, 5 credits AND Hydrology, 5 credits

B) Macroeconomics OR Urban and Regional Planning, 7.5 credits

C) General Chemistry AND/OR Environmental Soil Chemistry, 7.5 credits

D) Earth Science, 6 credits
Note that some courses within the program requires at least 20 credits basic knowledge of mathematics, and at least 6 credits in numerical methods/Programming or equivalent.

For further information see KTH:s admission regulations in the KTH regulatory framework, www.kth.se

Selection

The selection process is based on the following selection criteria: University, previous studies (e.g. GPA, relevant courses and English proficiency) and any relevant work experience. The evaluation scale is 1-75.

Implementation of the education

Structure of the education

The academic year is 40 weeks and is divided into two semesters, autumn and spring. Each semester consists of two study periods. For information on the extent of the school year and of the exam periods, see KTH.se.

The offered courses within the programme are based on a combination of theoretical and practical approaches – both in the field as well as in laboratory; using tools as GIS, different computer models and tools for decision support. In each period around four courses are offered within the program from which the student selects two. A course in scientific theory and research on 7.5 credits is mandatory to get a master's degree at KTH.

There is in general a large degree of freedom for the students to select courses within the programme, given that the specific course prerequisites are fulfilled. Seven different competence profiles are meant to be an advice on choice of courses and course sequences for competitive specializations. In each competence profile there is an inherent progression. The different competence profiles are:

1. Water Technology
2. Environmental Geotechnology
3. Water and Wastewater Engineering
4. Environmental Management and Information
5. Sustainable Infrastructure
6. Environmental Systems Analysis
7. Sustainable Societies

MJ2673 Research Methodology and Theory of Science or equivalent course in scientific theory and methodology, is mandatory in the context of studies in the programme.

Courses

The programme is course-based. Lists of courses are included in appendix 1.

All courses except the master degree project are 7.5 credits and last for one period.
In order to promote specialization within the competence profile, there are certain limitations in the number of possible choices within program's courses due to (i) differences in students' prerequisite backgrounds (see above under Eligibility and Selection), and (ii) course prerequisites due to progression in the competence profiles.

**Grading system**

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

Information regarding the scale found in the curriculum.

**Conditions for participation in the programme**

Participation requires admission to courses within the programme and course registration. Course registration is done via the personal menu at www.kth.se

For students starting their education from the autumn semester 2018, previous promotion requirements have been replaced with special admission requirements to each course. Admission requirements are specified in the course syllabus.

**Recognition of previous academic studies**

Students are able to apply for credit transfer for courses taken at another university, in Sweden or abroad.

For more information please refer to KTH's regulations on KTH.se and the Education office

**Studies abroad**

Students have the opportunity to spend one semester at one of KTH’s partner universities abroad.

For more information and recommendation on the appropriate semester for exchange studies refer to the International coordinators.

**Degree project**

The degree project is the final part of the education. The scope of the degree project is 30 ECTS credits.

In order to register for the thesis, the student must have passed at least 60 credits of courses in the programme (including the mandatory course MJ2673).

The subject of the thesis is determined by the student and examiner/supervisor. The examiner shall be an permanently employed teacher from the School of Architecture and Built Environment, whereas the supervisor can be a graduate student/teacher at a Swedish university or a company representative. If a student intends to choose a subject in another scientific field, he/she should apply for exemption from the vice-dean of education at the School.
The thesis work is graded pass (P) or fail (F).

**Degree**

Title: Master of Science with a Major in the Built Environment specialized in Environmental Engineering and Sustainable Infrastructure, 120 credits

The degree of Master in the programme described above is obtained after completion of courses comprising 120 ECTS credits of which

- at least 60 ECTS credits at advanced level including mandatory and conditionally elective courses
- 30 ECTS credits degree project within the master programme
- a maximum of 30 ECTS credits of entirely elective courses

When the master's programme is a final part of the degree programme in Civil Engineering and Urban Management or of the degree programme in Energy and Environment, there may be additional requirements according to the corresponding study programmes. For example, a master of science degree in the above degree programmes should include mathematics and science subjects for a minimum of 45 higher education credits.

Application for Degree

The application for degree certificate is done through the personal menu on KTH.se.

*Appendix 1 - Course list*
*Appendix 2 - Programme syllabus descriptions*
Appendix 1: Course list

Master's Programme, Environmental Engineering and Sustainable Infrastructure, 120 credits (TMHIM), Programme syllabus for studies starting in autumn 2020

General courses

Year 1

Mandatory courses (7.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5 hp</td>
<td>Second cycle</td>
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</tbody>
</table>

Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE2104</td>
<td>Environmental Measuring and Monitoring</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2201</td>
<td>Environmental Dynamics/Physical Processes</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2304</td>
<td>Water and Wastewater Handling</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2501</td>
<td>Environmental Impact Assessment</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2503</td>
<td>Environmental Data</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2507</td>
<td>Strategic Environmental Assessment</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2610</td>
<td>Applied Hydrology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2612</td>
<td>Hydraulic Engineering</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2801</td>
<td>Environmental Chemistry and Risk Assessment</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2141</td>
<td>Urban Infrastructure</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2142</td>
<td>Political Economy for Environmental Planners</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2143</td>
<td>Sustainable Rural and Urban Development</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2148</td>
<td>Governance of Land and Water</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2300</td>
<td>Natural Resources Management Tools</td>
<td>7.5 hp</td>
<td>Second cycle</td>
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</tbody>
</table>
Year 2

Mandatory courses (7.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJ2673</td>
<td>Research Methodology and Theory of Science</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE2107</td>
<td>Modelling of Water Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2302</td>
<td>Water Treatment Processes and Technology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2401</td>
<td>Engineering Geology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AF283X</td>
<td>Degree Project in Hydraulic Engineering, Second Cycle</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG212X</td>
<td>Degree Project in Urban and Regional Planning, Second Cycle</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2800</td>
<td>Life Cycle Assessment</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2301</td>
<td>Applied Hydrogeology</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL230X</td>
<td>Degree Project in Environmental Engineering and Sustainable</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td>Infrastructure, Second Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL250X</td>
<td>Degree Project in Strategies for Sustainable Development,</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
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<td></td>
<td>Second Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL2511</td>
<td>Resilience Thinking in Sustainable Planning</td>
<td>7.5 hp</td>
<td>Second cycle</td>
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</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Environmental Engineering and Sustainable Infrastructure, 120 credits (TMHIM), Programme syllabus for studies starting in autumn 2020

This programme has no specialisations.