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 15 (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 program academic year 2015/2016. Later decisions may affect year 2 in the program. Please look at www.kth.se/studies?l=en_UK for further information.

Knowledge and understanding

After completion of the Master of Science program 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 program 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 program 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 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), 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) ought to be met:

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

B) Economics, 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 require at least 20 credits of a basic knowledge of mathematics, and at least 6 credits in numerical methods/Programming or equivalent.

Selection

The selection process is based on the following selection criteria: University, previous studies (for instance GPA, grades in specific subjects and English), motivation for the studies (for instance letter of motivation, references, thesis proposal and 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 http://www.kth.se/student/schema.

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.

The program starts with the two courses, Environmental Impact Assessment (AE2501) and Environmental Data (AE2503) in the first term. These courses provide a background in environmental assessment and management of environmental data that is fundamental to all engineers in the field of Environmental Engineering and Sustainable Infrastructure. From period 2 year 1 and onwards 4 or 5 courses per period are offered within the program. The course Theory and Methodology of Science with Applications (AK2036) is mandatory and can be read at few alternative occasions.

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

Courses

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

All courses except the master thesis 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. The first term courses do not have any special prerequisites.

**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.

**Conditions for participation in the programme**

A prerequisite for a students' participation in studies at KTH is that the student performs a course registration and semester registration for each semester.

Before the first semester you are automatically registered in connection with enrollment in the semester.

Before the second, third and fourth semester students must register online. Registration is done under the personal menu on the KTH:s webb page.

Course registration is done by all students on the program at www.antagning.se

**Recognition of previous academic studies**

Students may request to be given credit for a course/courses from another college/university within or outside Sweden. KTH’s policy for recognising previous academic studies is available in full in KTH’s regulations at www.kth.se.

**Studies abroad**

There are opportunities for exchange within the programme under existing agreements.

For more information and recommendation on the appropriate semester for exchange studies refer to the program's international administrators.

**Degree project**

The scope of the thesis is 30 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 AK2036).

The subject of the thesis is determined by the student and examiner/supervisor. The examiner shall be an associate professor (or professor) 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.

Information regarding the grading scale on the degree refer to the syllabus.

**Degree**

**Title:** Degree of Master of Science (Two years) in Environmental Engineering and Sustainable Infrastructure

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

- at least 90 ECTS at advanced level including mandatory and conditionally elective courses and a 30-credit degree project within the master programme

In addition is allowed:

- a maximum of 15 ECTS from courses in any engineering area at basic or advanced level
- a maximum of 15 ECTS of entirely elective courses

In the event that the master's program 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 is done under the personal menu on KTH:s webb page.

*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 2015

General courses

Year 1

Mandatory courses (7.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits 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 Second cycle</td>
</tr>
</tbody>
</table>

Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE2104</td>
<td>Environmental Measuring and Monitoring</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2201</td>
<td>Environmental Dynamics/Physical Processes</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2304</td>
<td>Water and Wastewater Handling</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2501</td>
<td>Environmental Impact Assessment</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2502</td>
<td>Natural Resources Management</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2503</td>
<td>Environmental Data</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2507</td>
<td>Strategic Environmental Assessment</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2610</td>
<td>Applied Hydrology</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2612</td>
<td>Hydraulic Engineering</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2707</td>
<td>Governance of Land and Water</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AE2801</td>
<td>Environmental Chemistry and Risk Assessment</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AG2141</td>
<td>Urban Infrastructure</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AG2142</td>
<td>Political Economy for Environmental Planners</td>
<td>7.5 hp Second cycle</td>
</tr>
<tr>
<td>AG2143</td>
<td>Sustainable Rural and Urban Development</td>
<td>7.5 hp Second cycle</td>
</tr>
</tbody>
</table>
### Year 2

#### 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>AE2708</td>
<td>Project in Environmental Engineering</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AF2609</td>
<td>Foundation Engineering</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>AG2803</td>
<td>Ecosystem Support and Environmental Justice</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2811</td>
<td>Planning for Resilience</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>
<tr>
<td></td>
<td>Second Cycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Environmental Engineering and Sustainable Infrastructure, 120 credits (TMHIM), Programme syllabus for studies starting in autumn 2015

This programme has no specialisations.