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 14 (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 2014/2015. 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**

Basic eligibility requirements: A completed Bachelor’s degree, corresponding to a Swedish Bachelor’s degree (180 higher education credits), or equivalent academic qualifications from an internationally recognized university. Applicants must prove their proficiency in English (English B or equivalent) through an internationally recognized test.

Specific eligibility 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. The credits shall include basic knowledge in mathematics for at least 20 higher education credits and basic knowledge in numerical analysis, programming, or equivalent, for at least 6 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
The different prerequisites provide access to specific courses within the master programme (see Appendix 1).

Selection procedure: The selection process for the Environmental Engineering and Sustainable Infrastructure programme is based on a total evaluation of the following criteria: university, grade point average (GPA), course work of relevance to the programme, relevant work experience, references, English proficiency and motivation letter.

Complete information on the eligibility requirements can be found in the local admission policy of KTH, see: http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/antagning?l=en_UK

**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 two alternative occasions, in year 1 period 3 or in year 2 period 1.

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

A more extensive description of the competence profiles, and how the different courses relate to these, can be found on: http://www.kth.se/abe/om-skolan/organisation/inst/see/om/avd/lwr/edu/eesi
Courses

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

The programme is course-based and all courses except the master thesis are 7.5 credits and last for one period. Lists of courses are included in Appendix 1.

In order to promote specialization within the competence profile, there are certain limitations in the number of possible choices 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 in addition to the specific eligibility requirements. Details on course prerequisites can be found in Appendix 1.

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 studying at KTH is that every term, students must enrol in their courses and register for the term.

Registration for courses requires course selection in LADOK (student registry). Course selection is done either through the course selection web application or through the student’s educational office. Course registration is done by the department giving the course. Students wishing to drop the course should notify the department that is giving the course.

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

The ABE school has a well-developed network of student exchange programmes with leading seats of learning inside and outside Europe. As part of the programme there are opportunities for exchange under existing agreements. Term 3 is particularly recommended for this purpose.

For more information, refer to KTH’s regulations at http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/utbytesstudier.

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 either 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 is graded on a scale of A to F, where E is required to pass and A is the highest grade.

**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*

Information on processing and which documents must be submitted for the application is available under the link: http://www.kth.se/student/examen.

**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 2014

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>AE2601</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

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>
</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>AE2708</td>
<td>Project in Environmental Engineering</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2802</td>
<td>Hydrogeology</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>AL230X</td>
<td>Degree Project in Environmental Engineering and Sustainable Infrastructure, Second Cycle</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL250X</td>
<td>Degree Project in Strategies for Sustainable Development, Second Cycle</td>
<td>30.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Supplementary information

KTH’s president has decided that starting 2015-07-01, the grades of pass (P) and fail (F) shall be used for degree projects. Students who began their studies between 2007-07-01 and 2015-06-30 may apply to conduct their degree projects under the grading scale A-F. Such an application shall be made prior to registration in a degree project course, and prior to starting the course.
Appendix 2: Specialisations

Master's Programme, Environmental Engineering and Sustainable Infrastructure, 120 credits (TMHIM), Programme syllabus for studies starting in autumn 2014

This programme has no specialisations.