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 13 (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 2013/2014. 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.

Extant and content of the programme

The programme contains seven so-called course sequences with a certain level of internal progression. These 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

Instruction language: English (entirely)

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, including the following is required:

• Basic knowledge in mathematics for at least 20 higher education credits
• Basic knowledge in numerical analysis, programming, or equivalent, for at least 6 higher education credits
• At least two of the following competence profiles must be met:
  A) Fluid Mechanics, 5 credits Hydrology, 5 credit
  B) Economics, 7,5 credit
  C) General Chemistry and/or Environmental Soil Chemistry, 7,5 credits
  D) Earth Science, 6 credits

The profiles 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 related to the programme, motivation letter and relevant work experience, references and English proficiency.

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 programme consists of courses comprising 90 higher education credits followed by a degree project on advanced level (30 higher education credits). The first term starts with two conditionally elective courses followed by all students in the program, *Environmental Impact Assessment and Environmental Data*. These courses provide 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 onwards there are 4 or 5 courses per period, of which the student chooses two. Courses should be selected from the courses listed as conditionally elective with the exception of 15 higher education credits that can be chosen freely outside the list, after approval by the coordinator of the Master programme. Recommended course sequences for different specializations are found in Appendix 2. The course *Theory and Methodology of Science with Applications (AK2036)* is mandatory and can be read at two alternative occasions, in period 3 and 5.

One of the courses in period 5 is completely project-based, the *Project in Environmental Engineering and Sustainable Infrastructure*. Several other courses contain large project-based parts.

**Courses**

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

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All courses except the master thesis are 7.5 credits and last for one period. No freely elective course is included in the programme.

In order to promote specialization within the course sequence, there are certain limitations in the number of possible choices due to (i) differences in students’ competence profile (see above under Eligibility and Selection, and (ii) course prerequisites due to progression in the course sequences. 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**

This programme offers opportunities to study abroad. In order to be eligible for studies abroad within the framework of any exchange agreement with foreign universities, students should be enrolled at KTH, have completed at least two years of studies, and be keeping pace with their studies.

Selection is based on weighted average grades in compulsory courses.

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 67.5 credits of courses in the programme.

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. The prerequisite for starting the degree project is completed courses corresponding to 60 credits.

Degree

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

To obtain the above master's degree, students must have passed courses of at least 120 higher education credits, of which the following must be included:

- at least 90 higher education credits from courses on the second level that are included in the master programme (including the master thesis of 30 higher education credits), and at least 15 additional credits from courses in any engineering area
- a maximum of 15 higher education credits of entirely elective courses;
- an approved course in "Theory and Methodology of Science"

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 2013

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</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Optional 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</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2201</td>
<td>Environmental Dynamics/Physical Processes</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2304</td>
<td>Water and Wastewater Handling</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2501</td>
<td>Environmental Impact Assessment</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2502</td>
<td>Natural Resources Management</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2503</td>
<td>Environmental Data</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2507</td>
<td>Strategic Environmental Assessment</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2610</td>
<td>Applied Hydrology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2612</td>
<td>Hydraulic Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2707</td>
<td>Governance of Land and Water</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2801</td>
<td>Environmental Chemistry and Risk Assessment</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2141</td>
<td>Urban Infrastructure</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2142</td>
<td>Political Economy for Environmental Planners</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2143</td>
<td>Sustainable Rural and Urban Development</td>
<td>7.5</td>
<td>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</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</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE211X</td>
<td>Degree Project in Ground Water Chemistry, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE212X</td>
<td>Degree project in Land and Water Resources, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE221X</td>
<td>Degree Project in Water Resources Engineering, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2302</td>
<td>Water Treatment Processes and Technology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE230X</td>
<td>Degree project in Water, Sewage and Waste, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2401</td>
<td>Engineering Geology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE241X</td>
<td>Degree Project in Geological Engineering, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE251X</td>
<td>Degree Project in Environmental Assessment, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2708</td>
<td>Project in Environmental Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AE2802</td>
<td>Hydrogeology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AF2609</td>
<td>Foundation Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2800</td>
<td>Life Cycle Assessment</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2803</td>
<td>Ecosystem Support and Environmental Justice</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AG2811</td>
<td>Planning for Resilience</td>
<td>7.5</td>
<td>Second cycle</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 2013

This programme has no specialisations.