Programme syllabus

Master's Programme, Sustainable Technology, 120 credits
Masterprogram, teknik och hållbar utveckling
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 starting 2015-2016. There could be changes in year 2 – please check www.kth.se for information about the latest study plan.

Beyond the objectives which are specified in the Higher Education Degree Ordinance, there are also specific goals for this programme. A graduate from the programme must:

Knowledge and understanding

- have a broad scientific and system based knowledge and understanding within the area of Industrial Ecology aimed at reaching a sustainable development, including society’s effects on the world’s ecosystems and an understanding of today’s global societal challenges
- have fundamental knowledge about, and theoretical understanding of, methods, strategies and tools in Industrial Ecology for example: sustainability analysis, scenario studies, environmental management, environmental modelling, waste management, environmental engineering, and environmental system analyses (such as LCA, SFA, MFA, CBA)
- apply principles and processes of natural ecosystems to develop models for efficient industrial systems including directed towards efficient circular use of materials and circular economy
- identify and quantify material and energy flows as well as interrelationships within and between techno, economic, ecologic and social systems and natural systems
- identify or develop strategies and methods to minimize environmental impact of industrial production processes and material products
- have deep knowledge within a specific area connected to Industrial Ecology applied on for example urban and social development, “blue growth”, bio based economy, industrial symbiosis or industrial production

Skills and abilities

- possess the ability to analyse and formulate the role of technology’s in sustainable development
- apply new and existing research to understand industrial systems and their environmental and resource implications
- Possess a good ability to analyse and validate societal challenges for sustainable development
- be able to implement strategies and tools used within the knowledge area “Industrial Ecology”
· possess the ability to critically analyse, formulate, and handle an environmental problem from a systems perspective

· independently, as well as in a group, be able to apply knowledge and abilities in a practical context, with regards to relevant scientific, professional and job-related aspects, and social judgments and approaches

· in a professional way be able to critically communicate, orally and in writing, one’s own completed work to different stakeholders

· altogether be able to contribute to improved socio-technical system solutions leading to increased resource efficiency and improved material cycles

**Ability to make judgements and adopt a standpoint**

- have a good understanding that the engineering-problems in areas of sustainable development and Industrial Ecology are often complex, value based and can sometimes contain contradictions

- be aware of private responsibility and the ethical standpoints which can occur in working with sustainable development

KTH’s local degree ordinance can be found in KTH’s guidelines, www.kth.se.

**Extent and content of the programme**

The programme consists of 120 credits which correspond to two years full time study. The programme is primarily on the second level. The programme consists of compulsory and conditionally elective courses divided depending on entrance.

The language of instruction for the programme is English. Certain courses are also offered in Swedish.

**Eligibility and selection**

**Basic requirements**

In order to be eligible for the Master’s programme, a relevant higher education degree, technical Bachelor degree, or other corresponding technical, natural or other science degree relevant for the programme in the first cycle, comprising 180 higher education credits is required.

Other studies or work experiences are assessed based on the competence referred to.

**Special requirements**

No special requirements

**Selection into the programme**

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.

For eligibility requirements and selection criteria, please refer to KTH's admission regulations in KTH regulations www.kth.se
Implementation of the education

Structure of the education

The study year comprises 40 weeks and is divided into two terms, autumn and spring term. Each term comprises two study periods. Study years, terms, and study periods are described in KTH’s guidelines, www.kth.se

Structure of the education

The programme’s first three terms consist of theoretical courses, some of which are compulsory for all students. The studies are, to a large extent, project-based work and case studies which means that a large focus will be on training, communication, critical thinking, and oral and written presentations. The courses are linked to practical knowledge through collaboration with different companies and authorities. The programme concludes with a degree project in the fourth term.

Courses

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

Course lists for each input as shown in appendix 1

* Input TSUTM (the international and the KTH extern students)

* Input CENMI

* Input CDEPR, CMAST and CMATD

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

Semester registration and Course registration

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

All of program students from second semester do a course application on www.antagning.se, and course registration done in the personal menu.

For studies in study year 2:

At least 45 higher education credits must be completed from study year 1 by the end of the examination period in August. Students who have not fulfilled this requirement must, in collaboration with a study adviser, create an individual study plan. The main intent with the individual study plan is that the student will complete the remaining elements during the next coming study year. In the study plan, the remaining elements should be included as well as suitable courses from the next study year. Special consideration should be given to the courses’ prerequisites.

Recognition of previous academic studies

Students are able to apply to receive credit for the results of the course/courses at another college/university within the country or abroad.
For more information please refer to KTH's regulations in www.kth.se and program's student guidance counselling.

**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 degree project is a course compromising 30 credits meaning it should cover 20 weeks full time studies. The thesis work should not include other courses (with own course codes).

Generally, a larger portion of the studies must be completed before the degree project can be started. At least 60 credits should be completed where of 30 credits on advanced level inside the main area of study

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

KTH’s rules regarding the degree project for the Master’s degree can be found in the KTH Guidelines: Degree projects

**Degree**

In order to earn Degree of Master of Science (Two Years), passing grades in all courses which are included in the student’s study plan are required. The study plan must comprise 120 higher education credits which include:

- At least 108 credits on advanced level of the masters programmes compulsory and conditional elective courses (including a degree project consisting of 30 credits)

- A maximum of 12 credits elective courses

For engineering programmes coupled to the master programme examination requirements for the engineering programme should also be fulfilled

*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, Sustainable Technology, 120 credits (TSUTM), Programme syllabus for studies starting in autumn 2015

**General courses**

**Year 1**

**Mandatory courses (22.5 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL2181</td>
<td>Environmental System Analysis and Decision-making</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2615</td>
<td>Introduction to Industrial Ecology, larger course</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2659</td>
<td>Technology and Ecosystems, Larger Course</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

*This course is only for TSUTM-international and CENMI students*

**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>AL2130</td>
<td>Waste Management</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2140</td>
<td>Cleaner Production</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2156</td>
<td>Applied Ecology</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2160</td>
<td>Environmental Management</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2161</td>
<td>Environmental Management II, Advanced Course</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td><em>entry requirements AL2160</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL2190</td>
<td>Ecological Economics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2191</td>
<td>Technology and Sustainable Development</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2685</td>
<td>Smart Cities and Climate Mitigation Strategies- Project Based</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

The Master Program Sustainable Technology, TSUTM, has three routes of entry as below;
* Input for the international and KTH external students, "direct entrance”
* Input from the Degree Programme in Energy and Environment (CENMI)
* Input from ITM school’s Degree Programs in:Design and Product Realisation (CDEPR), Mechanical Engineering (CMAST), Materials Design and Engineering (CMATD)
Note!

* At least four of the Conditionally Elective courses must be chosen in Year 1.

* At least six of the Conditionally Elective courses must be chosen in year 1 and 2, which two of the courses AL2161, MJ2641 or MJ2681 have to be included for a Degree.

**Year 2**

**Mandatory courses (43.5 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL2101</td>
<td>Applied Industrial Ecology</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL227X</td>
<td>Degree Project in Industrial Ecology, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2673</td>
<td>Research Methodology and Theory of 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>AG2800</td>
<td>Life Cycle Assessment</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>AL2142</td>
<td>Material and Energy Flow Accounting for Cleaner Production entry requirements AL2140</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

The Master Program Sustainable Technology, TSUTM, has three routes of entry as below;
* Input for the international and KTH external students, "direct entrance"
* Input from the Degree Programme in Energy and Environment (CENMI)
* Input from ITM school’s Degree Programs in: Design and Product Realisation (CDEPR), Mechanical Engineering (CMAST), Materials Design and Engineering (CMATD)

Note!

At least six of the Conditionally Elective courses must be chosen in year 1 and 2, which two of the courses AL2161, MJ2641 or MJ2681/AG2800 have to be included for a Degree.

**Recommended elective courses for transitional programme CENMI is as follows:**

MJ2695 Sustainable development in developing country, 6.0 ECTS

AG2800 Life Cycle Assessment, 7.5 ECTS

MJ2413 Energy and Environment, 6.0 ECTS

MJ2407 Sustainable Energy Utilisation, 9.0 ECTS

MJ2405 Sustainable Power Generation, 9.0 ECTS

**Year 3**
Appendix 2: Specialisations

Master's Programme, Sustainable Technology, 120 credits (TSUTM), Programme syllabus for studies starting in autumn 2015

This programme has no specialisations.