Programme syllabus

Master's Programme, Sustainable Energy Engineering, 120 credits
Masterprogram, hållbar energiteknik
120.0 credits

Valid for students admitted to the education from autumn 08 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Beyond the objectives which are specified in the Higher Education Degree Ordinance, there are also specific goals for this programme. After completing the programme, the student should:

Knowledge and understanding

Knowledge and understanding

• Have a broad, scientific foundation to be able to work within the energy engineering area. It should comprise knowledge about sustainable systems, energy sources and usage, and judgements of technical, economical, and environmentally-related consequences related to different energy re-usage processes.

• Show broad knowledge within this technical area, including knowledge in mathematics and natural science, and essentially deepened knowledge within certain parts of the area.

Skills and abilities

• Show a good ability to, independently as well as in a group, be able to apply knowledge and abilities in practical activities with regards to relevant scientific professional and social judgements and viewpoints.

• Show a good ability to analyse, formulate, and handle technical problems from a system perspective, with an overview on their life-cycle, from idea/need to specification, development, maintenance and termination, and the ability to set conditions, decide necessary resource consumption and manage processes for problem solving and realisation.

• Possess individual and professional skills like languages, leadership, project management, and communication for work as an engineer in a leadership role or as a leader in a technical intensive company, or in order to be able to continue toward a research career.
Ability to make judgements and adopt a standpoint

- Have especially good understanding that engineering-related problems are often complex, can be incompletely defined and sometimes contain conflicting conditions.

- Be aware of the responsibility and the ethical viewpoints which can arise in connection with different technical, organisational, economical, ecological and social activities.

Reference to the local degree ordinance of the Royal Institute of Technology (The KTH-Handbook).

Extent and content of the programme

The programme consists of 120 higher education credits which correspond to two years full time studies. The programme is mainly on the second level.

Possible specialisation areas for Sustainable Energy Engineering:

- Energy usage
- Power Production
- Nuclear Power Technology
- Solar Energy

The language of instruction for the programme is English.

Eligibility and selection

In order to be eligible to apply to the master’s programme, a relevant higher education degree of at least 180 higher education credits, degree of bachelor in science and engineering or technical bachelor’s degree preferably within Machine Engineering or Chemical Engineering is required. Other corresponding technical or natural scientific degrees on the first level can also give eligibility, providing that courses in technical thermodynamics, heat transference and technical Electro-mechanics are included. Other studies or work experiences are judged on the basis of the actual competencies which are referred to.

The selection to the programme is based on the evaluation of the following criteria: university/higher education institute, grades, courses relevance for the programme, suggestion to the degree project, recommendation letters, work experience and references.

The reference to KTH’s admission policy can be found in the KTH-Handbook.

Implementation of the education

Structure of the education
The programme begins with a common course packet which gives a solid base for the four specialisations – Power Production, Energy Usage, Nuclear Power Safety, and Solar Energy – which is given mainly during the second term. The third term consists of extended studies within the energy area with a research preparation perspective. The programme is concluded with a degree project during the last term.

Study years, terms, and study period descriptions can be found in the KTH-Handbook.

Courses

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

Term Enrolment

A condition in order to be able to participate in the studies is that the student must enrol for the next term every spring and fall. This is done via “Mina Sidor” on KTH’s website between November 1st and 15th and between May 1st and 15th.

With the enrolment, the student has submitted their intention of studying and participating in the programme. Only after that is it possible for the student to:

- register for courses
- register for the term
- get results

Course Selection

Certain opportunities to take optional courses exist. The selection is done on “Mina Sidor” on KTH’s website in the same manner as the term enrolment.

Conditions for participation in the programme

For studies in study year 2:

At least 45 higher education credits from study year 1 must be completed by the exam period in August.

Students which have not fulfilled this requirement must consult with the study counsellor and set up an individual study plan. The main goal with the study plan is that the student should complete the remaining
elements during the next study year. In the study plan, the remaining elements and also suitable courses from
the next study year are included. Special regard should be taken to the courses’ prerequisites.

**Specialisation Selection**

The selection of specialisation is carried out in the form of the course selection before the second term starts. There is no limitation to the number of places available.

**Recognition of previous academic studies**

The student has the possibility to apply to receive credit from courses taken at another university/higher
education institution both in Sweden and from abroad. The application can be found on KTH’s website.

KTH’s policy for recognition of previous academic studies can be found entirely in the KTH-Handbook.

**Studies abroad**

Students in this programme have no possibility to study abroad.

**Degree project**

KTH’s rules for the degree project for the Master’s degree with specialisation can be found in the KTHHandbook.

Generally, the degree project work can be started only after a large portion of the studies have been completed.

KTH’s rules for the degree project can be found in the KTH-Handbook

*KTH-Handbok 2, page 15.5*

*www.kth.se/info/kth-handboken/II/15/5.html*

**Degree**

In order to graduate with the Degree of Master of Science (Two Years) within the main area Machine
Engineering, a passing grade must be achieved in all courses which are in the student’s study plan. The study plan must constitute 120 higher education credits including a degree project consisting of 30 higher education credits.

KTH’s local degree ordinance can be found in the KTH-Handbook.

[Appendix 1 - Course list](#)
[Appendix 2 - Programme syllabus descriptions](#)
Appendix 1: Course list

Master's Programme, Sustainable Energy Engineering, 120 credits (TSUEM), Programme syllabus for studies starting in autumn 2008

General courses

Year 1

Mandatory courses (48.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJ1402</td>
<td>Introduction to Energy Technology</td>
<td>3.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MJ2405</td>
<td>Sustainable Power Generation</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2407</td>
<td>Sustainable Energy Utilisation</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2409</td>
<td>Applied Energy Technology, Project Course</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2410</td>
<td>Energy Management</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2411</td>
<td>Renewable Energy Technology</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2412</td>
<td>Renewable Energy Technology, Advanced Course</td>
<td>6.0 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>MJ2412</td>
<td>Renewable Energy Technology, Advanced Course</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2422</td>
<td>Thermal Comfort and Indoor Climate</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2423</td>
<td>Applied Refrigeration and Heat Pump Technology</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2426</td>
<td>Applied Heat and Power Technology</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2427</td>
<td>Applied Reactor Technology and Nuclear Power Safety</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Supplementary information
For Power Generation you have to study MJ2426 + MJ2427 or MJ2412.

### Year 2

**Mandatory courses (13.5 Credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2030</td>
<td>Theory and Methodology of Science (Natural and Technological Science)</td>
<td>4.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2424</td>
<td>Computational Methods in Energy Technology</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2440</td>
<td>Measurement Techniques</td>
<td>3.0 hp</td>
<td>Second cycle</td>
</tr>
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</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>FMJ3114</td>
<td>Heat Transfer</td>
<td>7.5 hp</td>
<td>Third cycle</td>
</tr>
<tr>
<td>FMJ3307</td>
<td>Fundamentals of Multiphase Flow and Heat Transfer</td>
<td>6.0 hp</td>
<td>Third cycle</td>
</tr>
<tr>
<td>ME2049</td>
<td>Frontiers in the Multidimensional Energy Society</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2241</td>
<td>Jet Propulsion Engines, General Course</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2420</td>
<td>Combustion Theory</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2421</td>
<td>Modelling of Thermodynamic Systems</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2425</td>
<td>Cooling of Electronics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2429</td>
<td>Turbomachinery</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2430</td>
<td>Thermal Turbomachinery</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2433</td>
<td>Advanced Topics in Sustainable Energy Utilisation</td>
<td>12.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2635</td>
<td>Environmental Modelling: Introduction and Application</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2652</td>
<td>Environmental Effects from Technical Systems and Processes</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2680</td>
<td>Environmental Systems Analysis</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2691</td>
<td>Technology and Sustainable Development</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Sustainable Energy Engineering, 120 credits (TSUEM), Programme syllabus for studies starting in autumn 2008

This programme has no specialisations.