Programme syllabus

Master's Programme, Materials Science and Engineering, 120 credits
Masterprogram, materialteknik
120.0 credits

Valid for students admitted to the education from autumn 09 (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 will:

Knowledge and understanding

• Have a broad knowledge about materials as well as processes in order to be able to develop and manufacture new materials and products
• Have a deepened knowledge within the chosen specialisation
• Have knowledge such that he/she will be able to work within the material related industry within research/development as well as in production and manufacturing

Skills and abilities

• Be able to identify, formulate, analyse and solve problems with regard to current circumstances (scientific, engineer-related, and social) based on ethical and professional standpoints.
• Show developed abilities to synthesize and implement skills within materials as well as processes
• Have a good ability to utilize modern modelling and simulation methods and their applications
• Have skills in presentation and communication such that good prerequisites for efficient work are achieved individually as well as in a multinational group.

Ability to make judgements and adopt a standpoint

• Show a professional and ethical responsibility in scientific, technical, ecological and social activities.
• Have understanding that engineering-related problems, considered from a system perspective are often complex, can be incompletely defined and sometimes contain conflicting conditions.

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

Extent and content of the programme

The programme consists of 120 credits which correspond to two years full time studies. The programme is mainly on the second level.
The programme has two specialisations, one for Materials Processing with course start in the spring term, and the other for Materials Design with course start in the fall term.

The language of instruction for the programme is English.

**Eligibility and selection**

**Basic eligibility requirements**

A Bachelor degree equivalent to a Swedish Bachelor's degree (180 ECTS), from a university recognized by government or accredited by other recognized organization. Students in their final year of undergraduate education may also apply and if qualified, receive a conditional acceptance. A good knowledge of written and spoken English is required. Applicants must provide proof of their proficiency in English. KTH accepts a TOEFL test score of a minimum of 550 (213 in the computer-based test, 79 in the internet based test) or an IELTS score of at least 6.0, no band lower than 5.0 (both general and academic accepted). English proficiency tests are waived for applicants with English as language of instruction (minimum 3 years of full-time higher education studies). A relevant certificate from the university has to be enclosed with the application. For EU citizens from KTH’s partner universities, a certificate from the University language department or the relevant Head of department stating the student's good level of English will be enough.

**Specific eligibility requirements**

In order to be eligible to the master’s programme, a higher education degree of at least 180 credits technical bachelor’s degree, or another corresponding technical or natural scientific degree in the first level within physics, metallurgy, material science, machine engineering, or chemical engineering must be completed. Other studies or work experiences are judged on the basis of the actual competencies which are referred to.

**Selecion criteria**

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

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

**Implementation of the education**

**Structure of the education**

The first term, technical intensive courses are taken. The courses are mainly theoretical with a portion of lab elements. Most of the courses include elements within practical and individual knowledge acquirement. There is a large focus on oral and written presentations.

In the second term, the knowledge is extended in courses which build on the first term. The “toolbox” which was started in the first term is extended with, first and foremost, computer simulations. The number of practical elements in the courses increases.

During the third term, a smaller project is performed which is chosen based on the student’s own interest after consultation with the programme’s teachers. The last term is devoted to a degree project which is carried out in a group of two, or individually. The degree project can be carried out at an industrial company or at a department.

Study year, term, and study period descriptions can be found in the KTH Regulations.

**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

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

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 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.

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.

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

Degree project

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 Regulations.

Degree

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

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

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Materials Science and Engineering, 120 credits (TMSEM), Programme syllabus for studies starting in autumn 2009

General courses

Year 1

Year 2

Mandatory courses (56.0 credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH200X</td>
<td>Degree Project in Materials and Process Design, Second Cycle</td>
<td>30.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2032</td>
<td>Mechanical Properties of Materials</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2033</td>
<td>Advanced Materials and Process Sciences</td>
<td>8.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2100</td>
<td>Powder Metallurgy</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2450</td>
<td>International Seminar in Material Processes</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Materials and Process Design (MD)

Year 1

Mandatory courses (59.5 credits)

<table>
<thead>
<tr>
<th>Course code</th>
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<th>Credits</th>
<th>Edu. level</th>
</tr>
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<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and</td>
<td>7.5</td>
<td>Second cycle</td>
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<tr>
<td></td>
<td>Technological Science)</td>
<td></td>
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<tr>
<td>MH2000</td>
<td>Experimental Methods</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2026</td>
<td>Introduction to Materials and Process Design</td>
<td>9.0</td>
<td>Second cycle</td>
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<tr>
<td>MH2027</td>
<td>Micro and Nano Structures in Materials</td>
<td>7.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2028</td>
<td>Chemical Kinetics and Rate Phenomena</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2029</td>
<td>Extractive Metallurgy</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2030</td>
<td>Applied Thermodynamics and Diffusion Kinetics</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2037</td>
<td>Ceramics</td>
<td>6.0</td>
<td>Second cycle</td>
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<td>Edu. level</td>
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</tr>
<tr>
<td>MH2300</td>
<td>Functional Materials</td>
<td>6.0</td>
<td>Second cycle</td>
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**Year 2**

**Mandatory courses (56.0 credits)**

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Appendix 2: Specialisations

Master's Programme, Materials Science and Engineering, 120 credits (TMSEM), Programme syllabus for studies starting in autumn 2009

Materials and Process Design (MD)