Programme syllabus

Master's Programme, Engineering Materials Science, 120 credits
Masterprogram, teknisk materialvetenskap
120.0 credits

Valid for students admitted to the education from spring 11 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Beyond the goals which are specified by the Higher Degree ordinance, there are also specific goals for this programme.

A graduate from the Materials Science programme must:

Knowledge and understanding

• Have a broad knowledge about material as well as processes in order to be able to develop and manufacture new materials and products

• Have such a knowledge that he/she is able to work within material-related industries within research and develop as well as in production and manufacturing

• Have good insights in current research and development work and industrial development trends.

Skills and abilities

• Be able to identify, formulate, analyze and solve problems with regards to current conditions (scientific, engineering-related and social) from an ethical and professional standpoint.

• have a good ability to utilize modern modelling and simulation methods and their applications

• have the ability to, within presentation and communication, be able to carry out an efficient work individually, as well as in groups.

• show the ability to create technical solutions which meet the needs of people and society
• show the ability to critically, creatively and independently plan and, with adequate methods and tools, create relevant products, processes and systems within a given timeframe and, with that, contribute to knowledge development and also evaluate the work

• take a responsibility for and show the ability to actively contribute to an effectively functioning team and collaborate with groups with different backgrounds

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

• Show a professional and ethical responsibility in scientific, technical, ecological, and social organisations

• have understanding that engineering-related problems, seen in a system perspective, are often complex, can be incompletely defined, and sometimes contain contradictions

• show such a ability which is required to participate in research and development work or for an independent work in other qualified technical activities

• show insights about technology’s possibilities and limitations, its role in society and human responsibility for how it is used, including social and economical aspects and environmental and workplace environment aspects

• be aware of, and show a feeling for the responsibility and the ethical standpoint which must be taken during development of new materials and processes

• Show the ability to identify one’s need for further knowledge and continuously develop one’s own competence

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

**Extent and content of the programme**

The programme comprises 120 higher education credits which correspond to two years of full-time study. The programme is primarily in the second cycle.

The programme has three tracks.

**Track 1: Industrial Materials**

**Track 2: Materials Science and Engineering:** This specialisation has two focuses, one towards Materials Processing with courses starting in the Spring Term, and one towards Materials and Process Design with courses starting in Fall Term.

**Track 3: Industrial Materials is a part of “The Nordic International Masters Platform (NIMP)”**

The courses in each respective track can be found in Appendix 1.

The language of instruction is English.
Eligibility and selection

In order to be eligible for the Master’s programme, a relevant higher education degree, Bachelor of Science in Engineering or technical Bachelor degree, preferably within Industrial Materials comprising 180 higher education credits is required.

Corresponding degree from other engineering programmes such as Chemical Engineering, Mechanical Engineering, and Technical Physics provide eligibility for the Master’s Programme. For KTH’s programmes with English as the language of instruction, there is a special requirement of English B or the corresponding knowledge.

Other, corresponding, degrees within natural science in the first cycle can also provide eligibility provided that the relevant courses in mathematics, chemistry, physics, thermodynamics, and solid mechanics have been fulfilled. Other studies or work experiences are judged by competencies referred to.

Selection into the programme is based on an evaluation of the following criteria: University/higher education institution, grades, courses relevant to the programme, personal letter, work experience and references.

For more information, refer to KTH’s admission regulations which can be found in KTH’s guidelines, www.kth.se

Implementation of the education

Structure of the education

Study years, terms, and study periods are described in KTH’s guidelines, www.kth.se

When necessary, lectures can be scheduled outside the normal study year according to KTH’s guidelines. www.kth.se

Structure of the education

1) IM (Industrial Materials). This track is intended for students with material science, metallurgical, or chemical engineering background. Students with a chemical engineering background will attend an obligatory course “Micro and Nano Structures in Materials” while metallurgists and material scientists will, instead, attend the obligatory course in “Process Engineering”.

For those students which have completed the first three years in the Material Design programme, this programme will lead to a Master of Science in Engineering in Material Design. For the other students, this programme will lead to a Master’s Degree in “Industrial Materials” (Two Years).

2) TMSEM: This track is primarily intended for international students and students with varying backgrounds. Thus, this track is narrower than IM to encompass varying educational backgrounds. The track has two focus areas with starts in both spring and autumn terms. The autumn start (Materials and Process Design), which is similar to IM and NIMP-IM, has a narrower scope and can be taken by students
without deep material science or metallurgic knowledge. The spring start (Materials Processing) is suitable for students with little material science knowledge.

3) NIMP-IM: Students will carry out their first term at KTH. Thereafter, they will move to their home university. An essential difference between IM and NIMP-IM is that students which take NIMP-IM will carry out a term at another higher education institution/university in Sweden, Finland, or Norway. Another difference is that NIMP can also accept students with another background, for example, Mechanical Engineering.

The programme is concluded with a degree project corresponding to 30 higher education credits in the second cycle during the fourth term which can be carried out at a company in the industry or at the institution.

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 participate in the studies is that the student, each spring and autumn must enrol for the coming term. This is done through “studera.nu”, between the 1st and 15th of November and the 1st and 15th of May, respectively.

By completing term enrolment, the student has confirmed their intention to study and participate in the programme. Only after that may the student be able to:

• Register for the term
• Register for courses
• Get reported results

Course registration

Registration for courses within the programme is done by the student before the start of each term, according to KTH’s central guidelines.

Conditions for participation in the programme

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.

Selection of track

This is done during programme registration.

Recognition of previous academic studies

The student has the possibility to apply for recognition of previous academic studies from course(s) from another university or higher education institution, national or international.

KTH’s entire policy for recognition of previous academic studies can be found in KTH’s guidelines www.kth.se

Degree project

KTH’s rules for the degree project can be found in KTH’s guidelines. Generally, it is required that a main portion of the studies must be completed before starting the degree project.

Degree

In order to earn the Degree of Master of Science within the major subject Material 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 a degree project consisting of 30 higher education credits, in the second cycle.

KTH’s local degree ordinance can be found at http://intra.kth.se/regelverk/

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

Master's Programme, Engineering Materials Science, 120 credits (TTMVM), Programme syllabus for studies starting in spring 2011

Track, Materials Processing (MPTA)

Year 1

Mandatory courses (18.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
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<tbody>
<tr>
<td>FMH3253</td>
<td>Fluid Mechanics and Heat Transfer</td>
<td>6.0 hp</td>
<td>Third cycle</td>
</tr>
<tr>
<td>MH2252</td>
<td>Casting Processing</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2278</td>
<td>Materials Forming</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Engineering Materials Science, 120 credits (TTMVM), Programme syllabus for studies starting in spring 2011

Track, Materials Processing (MPTA)