Programme syllabus

An accessible version of the syllabus can be found in the Course and programme directory.

Master's Programme, Engineering Design 120 credits

Masterprogram, industriell produktutveckling

Valid for students admitted to the education from autumn 10 (HT - Autumn term; VT - Spring term).

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

Programme objectives

A graduate from the Engineering Design programme must:

Knowledge and understanding

· show knowledge about the scientific foundation of and proven experiences in product development and mechanical engineering

· have a good insight into current research and development work as well as industrial development trends

· have good knowledge in processes, methods and tools in order to develop technical products
· have a good awareness about technical systems composed of mechanical and mechatronics components

· have a good awareness about interactive attributes in technical products, and the interaction between technical systems, people and the surrounding environment

· have good knowledge in methods in order to develop ecologically and economically sustainable products

· have a good foundation in natural and technical science with a specialization on the second level within machine construction, mechatronics, or combustible engine technology.

Skills and abilities

· show the ability to execute an innovative and professional product develop work

· show the ability to, with an overview perspective, integrate knowledge, critically and independently delimit and creatively identify, formulate and handle complex occurrences, inquiries, and situations

· 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 method and tools, create relevant products, processes and systems within a given timeframe and, with that, contribute to knowledge development and also evaluate the work

· show the ability to critically and systematically integrate knowledge and the ability to delimit, model, simulate, predict, and evaluate behavior and performance in a heterogeneous technical system, also with limitations or meaningful portions of irrelevant information

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

· show the ability, in both an international and national context, to clearly present and discuss one’s conclusions, and the knowledge and arguments which found them, in a dialogue with different groups, both orally and in writing.

· show the ability which is demanded in order to participate in research and development work or in order to independently work in another qualified technical organisation

Ability to make judgements and adopt a standpoint

· show the ability to make a judgment with regards to relevant scientific, social, and ethical aspects, and show an awareness about the ethical aspects of research and development work
· 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

· have an especially good understanding for the implicit complexity of technical systems and that processes which are developed for them are often incompletely defined and contain contradicting requirements and desires

· be aware of, and show a feeling for the responsibility and the ethical standpoint which must be taken during technical product development

· 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 on the second level and starts once per year.

Selectable tracks for *Engineering Design* are:

- Machine Construction (MKN)
- Mechatronics (MTK)
- Combustion engine technology (FMT)

The language of instruction is English.

**Eligibility and selection**

In order to be eligible for the Master’s programme, a relevant higher education degree preferably within Mechanical Engineering comprising 180 higher education credits is required.

Other, corresponding, degrees within natural science on the first level can also provide eligibility provided that the relevant courses in mechanics and product design have been fulfilled. Other studies or work experiences are judge by competencies referred to. For KTH’s programmes with English as the language of instruction, there is a special requirement of English B or the corresponding knowledge.

Selection into the programme is based on an evaluation of the following criteria: University/higher education institution, courses relevant to the programme, personal letter, work experience and references.
For more information, refer to KTH’s degree ordinance 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

The programme starts with a common course package which is both a preparation for research and provides a solid base for the three different tracks: combustion engine technology, machine construction, and mechatronics.

The programme is concluded with a degree project corresponding to 30 higher education credits on the second level during the fourth term.

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

In order for a student to be promoted to the programme’s second study year, he/she must have completed at least 45 higher education credits during the first study year by the time the last re-examination period concludes and before the second year’s studies are started.

Students who do not fulfill this requirement must, in collaboration with a study adviser, create an individual study plan.

Course registration
The student registers courses before each term according to KTH’s central guidelines.

Selection of specialization
Selection of track is mentioned in the personal letter which is attached to the application to the programme. The tracks’ core courses have prerequisites which may need to be taken to fulfill the requirements (see appendix 1)
Recognition of previous academic studies

Students have the possibility to apply for recognition of previous academic studies from course(s) at another higher education institution or university, both national and international.

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

Studies abroad

The degree project can be carried out outside of Sweden with the examiner’s approval.

Degree project

The degree project consists of 30 higher education credits on the second level.

A student must have completed at least 60 higher education credits, including obligatory courses for the chosen master’s programme, before he/she can start his/her degree project.

The degree project work is graded according the seven-level grading system, A-F.

KTH’s rules for the degree project for Master’s degrees with tracks can be found in KTH’s guidelines, www.kth.se

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 a degree project consisting of 30 higher education credits, on the second level.

The student must apply for the degree and show his/her Bachelor Degree (or corresponding).

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

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

Master's Programme, Engineering Design (TIPUM)
Track, Combustion Engineering (IPUA)

Year 1

**Mandatory courses (32.0 Credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
</table>
| MF2045 | Engineering Research Methodology  
*The course is offered over three semesters and about 80% attendance required* | 9.0 hp  | Second cycle   |
| MF2047 | Internal Combustion Engines 1                             | 6.0 hp  | Second cycle   |
| MF2048 | Internal Combustion Engines 2                             | 9.0 hp  | Second cycle   |
| SD2222 | Vehicle Components                                        | 8.0 hp  | Second cycle   |
# Conditionally elective courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
</table>
| EJ2410 | Hybrid Vehicle Drives  
*Profile Energy and Environment* | 7.5 hp  | Second cycle       |
| EL1120 | Automatic Control, General Course  
*Profile Mechatronics, option 1* | 6.0 hp  | First cycle        |
| KE2170 | Fuel Cell  
*Profile Energy and Environment* | 6.0 hp  | Second cycle       |
| MF1025 | Model Based Product Development II  
*Profile Machine Design* | 6.0 hp  | First cycle        |
| MF2007 | Dynamics and Motion Control  
*Profile Mechatronics, option 1* | 9.0 hp  | Second cycle       |
| MF2010 | Component Design  
*Profile Machine Design* | 6.0 hp  | Second cycle       |
| MF2019 | CAD 3D-modelling and Visualization  
*Profile Machine Design* | 6.0 hp  | Second cycle       |
| MF2042 | Embedded Systems for Mechatronics, I  
*Profile Mechatronics, option 2* | 6.0 hp  | Second cycle       |
| MF2044 | Embedded Systems for Mechatronics, II  
*Profile Mechatronics, option 2* | 6.0 hp  | Second cycle       |
| SG2212 | Computational Fluid Dynamics  
*Profile Fluid Mechanics* | 7.5 hp  | Second cycle       |
| SG2215 | Compressible Flow  
*Profile Fluid Mechanics* | 7.5 hp  | Second cycle       |
| SG2218 | Turbulence  
*Profile Fluid Mechanics* | 7.5 hp  | Second cycle       |

## Supplementary information

You should read one of the profiles:

- Machine Design
- Energy and Environment
- Mechatronics, option 1
- Mechatronics, option 2
- Fluid Mechanics
Year 2

Mandatory courses (18.0 Credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF2045</td>
<td>Engineering Research Methodology</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td>3 credits during year 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MF2049</td>
<td>Internal Combustion Engines, Project Course</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Conditionally elective courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJ2410</td>
<td>Hybrid Vehicle Drives Mechatronics</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF1025</td>
<td>Model Based Product Development II Mechatronics</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MJ2411</td>
<td>Renewable Energy Technology Energy and Environment</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2413</td>
<td>Energy and Environment Energy and Environment</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MJ2429</td>
<td>Turbomachinery Fluid Mechanics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

Supplementary information

You should read one of the profiles:

- Machine Design
- Energy and Environment
- Mechatronics, option 1
- Mechatronics, option 2
- Fluid Mechanics
# Track, Machine Design (IPUB)

## Year 1

### Mandatory courses (60.0 Credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF2004</td>
<td>Advanced Machine Design</td>
<td>18.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2006</td>
<td>Innovative Design II</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2010</td>
<td>Component Design</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2011</td>
<td>Systems Engineering</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2024</td>
<td>Robust and Probabilistic Design</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2030</td>
<td>Mechatronics basic Course</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2045</td>
<td>Engineering Research Methodology &lt;br&gt;&lt;br&gt; <em>The course is offered over three semesters and about 80% attendance required</em></td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

## Year 2

### Mandatory courses (33.0 Credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF2004</td>
<td>Advanced Machine Design &lt;br&gt;&lt;br&gt; <em>12 credits during year 2</em></td>
<td>18.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2032</td>
<td>Eco Design</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2045</td>
<td>Engineering Research Methodology &lt;br&gt;&lt;br&gt; <em>3 credits during year 2</em></td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
Track, Mechatronics (IPUC)

Year 1

Mandatory courses (66.0 Credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF2003</td>
<td>Mechatronics, Advanced Course</td>
<td>18.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2007</td>
<td>Dynamics and Motion Control</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2030</td>
<td>Mechatronics basic Course</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2034</td>
<td>Integrated Product Development</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2042</td>
<td>Embedded Systems for Mechatronics, I</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2043</td>
<td>Robust Mechatronics</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2044</td>
<td>Embedded Systems for Mechatronics, II</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF2045</td>
<td>Engineering Research Methodology</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

The course is offered over three semesters and about 80% attendance required

Year 2

Mandatory courses (27.0 Credits)

<table>
<thead>
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<th>Code</th>
<th>Name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF2035</td>
<td>Mechatronics, Advanced Course</td>
<td>18.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td>15 credits during year 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MF2045</td>
<td>Engineering Research Methodology</td>
<td>9.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td>3 credits during year 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Engineering Design (TIPUM)
Track, Combustion Engineering (IPUA)
No information entered.

Track, Machine Design (IPUB)
No information entered.

Track, Mechatronics (IPUC)
No information entered.