Programme syllabus

Master's Programme, Design and Implementation of ICT Products and Systems, 120 credits
Masterprogram, konstruktion och realisering av IT-produkter och -system
120.0 credits

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

Knowledge and understanding

To satisfy the requirements for a Master’s degree in Design and Implementation of IT Products and Systems, students shall:

- Show knowledge and understanding of the processes, methods and goals, associated with the design and development of information technology (IT) products, and associated systems.
- Show in depth understanding of how technologies, economics and business practice combine to produce complex next generation IT products and systems that satisfy the requirements of science, commerce and government.
- Show in depth knowledge of
  - information and communication engineering methods used in the realization of future product and system design
  - current research and methodology in interactive systems

Skills and abilities

To satisfy the requirements for a Master’s degree in Design and Implementation of IT Products and Systems, students shall:

- Demonstrate the ability to apply advanced technical knowledge in computer engineering, software, communication, materials, design, and business practice to processes that realize IT products and systems.
Demonstrate the ability to broadly integrate technology, management, mathematics and engineering knowledge to realize a broad range of IT products that span markets where solutions are not characterized by a single component or application.

Demonstrate the ability to critically, independently and creatively identify and formulate issues, to plan and with adequate methods perform qualified tasks within given time limits and thereby contribute to the evolution of knowledge as well as assess the work.

Demonstrate the ability to critically and systematically integrate knowledge; to measure, analyze and quantitatively evaluate complex situations, including product solutions to proposed problems and their commercial viability, technical success, process sustainability, and value to society.

Demonstrate mobility of skills required for participation in research and development, and the successful application of IT product and system development in a global marketplace.

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

To satisfy the requirements for a Master’s degree in Design and Implementation of IT Products and Systems, students shall:

- Demonstrate scientific and technical expertise, and proper judgment in the invention, development, integration, and appropriate deployment of technology with respect to solving the needs and requirements of the engineering community, commerce and society.
- Show the ability to assess and evaluate research, product development and commercialization, as well as the possibilities and limitations of science and technology, its role in society, and the responsibility of humans for its use.
- Show insight and responsibility in evaluating the potential advantages, limitations and threats of technology, taking into account sustainability, standards of integrity and ethics, and science’s commitment to society.
- Show evidence of the skills necessary for continued personal and professional growth.

Refer to the local degree policy of the Royal Institute of Technology, KTH intranet, regulations.

**Extent and content of the programme**

The extent of the programme in Design and Implementation of IT Products and Systems is two years. A Master’s degree is awarded after the successful completion of 120 hp. The education is on the advanced level (second cycle). All courses in the programme are conducted in the English language.

**Eligibility and selection**

The general admission requirements for Master’s programmes at KTH apply (KTH intranet, regulations).

The specific academic requirements for admission to the Master’s programme include an earned Bachelor's degree. The Bachelor’s degree may come from a wide range of technical majors that have an emphasis in information technology. For example, this can include but is not limited to Information Technology, Computer Engineering, Computer Science or Electrical Engineering. Students applying from such programs need to have completed the course work equivalent of at least 90 hp in technical subject areas. The aggregate of courses taken should in part reflect some programming skills and some aspects of computer hardware or computer architecture. Examples of such courses could include electronic circuits,
logic design, computer programming (using modern object oriented methods), algorithms and data structures, signals and systems, computer organization, data communications or software engineering. Students entering the program are not expected to have exhaustive training in all these areas, but instead will typically have had some subset of these courses.

In addition to the earned Bachelor’s degree, applicants must include the following required documents (in English):

- Curriculum Vitae
- Letter of Motivation
- 2 Letters of Recommendation
- Description of relevant work experience, if any

Students who meet the undergraduate course requirements are evaluated and selected for the programme based on their academic record including grades achieved in their courses, their English proficiency test scores, their motivation letter, and their letters of reference. Meriting previous subjects and relevant work experience are also considered. Eligible applicants are ranked according to the evaluation, and admission is granted according to the number of available positions determined for the programme.

See also the KTH intranet, regulations, for a full description of these policies.

**Implementation of the education**

**Structure of the education**

The degree programme takes place of two academic years. Each academic year lasts approximately nine months, and is divided into four study periods (two per term). Individual courses in the programme extend for one or more study periods.

See also the KTH intranet, regulations.

The first year of the programme is intended to provide advanced skills that are central to the process of IT product design and development. A combination of compulsory and conditionally elective courses covers applied technology, interactive systems, and business practice. The second year offers a further selection of elective courses, as well as the required Master’s thesis work. The programme also includes a methodological course which provide a basis for post-graduate studies.

**Courses**

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

Courses are either compulsory or conditionally elective. After application, students may be allowed to take extra courses in addition to the compulsory or conditionally elective courses. Information about course requisites can be obtained from the individual course descriptions available from the KTH web page.

**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**

Each student who has been admitted to the Master’s programme in Design and Implementation of IT Products and Systems should make study enrolment and course election before each term.

Conditionally elective courses are chosen by the student before the start of the second term of the first year, and before both terms in the second year. Choices are limited to the elective courses shown in appendix 1.

Registered students are expected to participate in both the required and elective courses they have registered for during a term. At the beginning of a course, students should indicate their attendance to the faculty member in charge of the course. The student should also inform the faculty member in charge of the course in the event that the student leaves the course before its normal termination.

The condition for promotion to the second year is completion of 45 hp in the first year.

The condition for starting the Master’s thesis project is 60 hp within the programme, with 30 hp advanced level work within the programme subject area.

**Recognition of previous academic studies**

Students who have completed courses at other universities or institutes of higher education can receive academic credit. To receive credit, these courses may not overlap in content with other courses the student has already taken at the KTH. To receive credit for a required course, the student must present evidence demonstrating that the course contents are at a similar level and extent to the contents in the corresponding KTH course.

Students wishing to receive credit for a course must talk to their study advisor, and abide by the judgement and decision of the KTH faculty member responsible for the course. The full KTH policy for receiving credit for previous studies can be found in the KTH intranet, regulations.

**Studies abroad**

All first year courses of the programme must be completed at KTH. Following the first year, further coursework may take place at another University abroad. Thesis project work may take place at either another University abroad, or at a business establishment.

**Degree project**

To successfully complete a Master’s Degree in Design and Development of IT Products and Systems, a student must complete a 30 hp Master’s thesis project. The thesis project is normally performed during the second year of the degree programme, and may not start until at least 60 hp of course work in the programme has been successfully completed.
The Master’s thesis project work may take place at the KTH, another university, or at a business establishment. Thesis work is evaluated and given a letter grade on a scale of A through F. This is the same grading method as other courses given at the KTH School of ICT.

For more information, see the KTH intranet, regulations.

Degree

A Master’s degree is granted after successful completion of all course and thesis work totaling a minimum of 120 hp. The name of the degree in English is “Degree of Master of Science (two years)”, and in Swedish is “Teknologie Masterexamen”.

Upon completion, application to receive the degree should be made to the central academic office at the KTH School of Information and Communication Technology.

Please refer to the local degree policy in the KTH intranet, regulations.

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

Master's Programme, Design and Implementation of ICT Products and Systems, 120 credits (TDIPM), Programme syllabus for studies starting in autumn 2010

General courses

Year 1

Mandatory courses (37.5 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC2005</td>
<td>Methodology of Interaction Design</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID2010</td>
<td>Programming of Interactive Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>II2202</td>
<td>Research Methodology and Scientific Writing</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>II2300</td>
<td>Product Realization Processes I</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>II2302</td>
<td>Sensor Based Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
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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>EQ1220</td>
<td>Signal Theory</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>IC1007</td>
<td>Human-computer Interaction: Principles and Design</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>IC2007</td>
<td>Collaborative Computing</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID1006</td>
<td>Java Programming</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ID2012</td>
<td>Ubiquitous Computing</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ID2218</td>
<td>Design of Fault-tolerant Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IK1550</td>
<td>Internetworking</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>IL2206</td>
<td>Embedded Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IL2212</td>
<td>Embedded Software</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IL2450</td>
<td>System Level Validation</td>
<td>7.5 hp</td>
<td>Second cycle</td>
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</tbody>
</table>

Year 2
## 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>DT2140</td>
<td>Multimodal Interaction and Interfaces</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IC2010</td>
<td>Advanced Individual Course in Human-Computer Interaction</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID1217</td>
<td>Concurrent Programming</td>
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<td>First cycle</td>
</tr>
<tr>
<td>ID2009</td>
<td>Artificial Intelligence: Principles and Techniques</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID2012</td>
<td>Ubiquitous Computing</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID2202</td>
<td>Compilers and Execution Environments</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>II2500</td>
<td>Product Realization Processes II</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IL2207</td>
<td>System-On-Chip Architectures</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IL2450</td>
<td>System Level Validation</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IS2500</td>
<td>RFID Systems</td>
<td>7.5 hp</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Master's Programme, Design and Implementation of ICT Products and Systems, 120 credits (TDIPM), Programme syllabus for studies starting in autumn 2010

This programme has no specialisations.