Programme syllabus

Degree Programme in Computer Science and Engineering
Civilingenjörsutbildning i datateknik

300.0 credits

Valid for students admitted to the education from autumn 19 (HT - Autumn term; VT - Spring term).

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

Programme objectives

The Engineering programme in Computer Science at KTH aims to give students opportunities and ability to participate in and lead the work on valuation, development and introduction of new computer technology.

Knowledge and understanding

The programme has the goal that a Master of Computer Science and Engineering should:

- have fundamental knowledge within Computer Science and Engineering.
- have profound knowledge in mathematics, i.e. have the ability to explain and carry out mathematical reasoning and define and analyse mathematical models.
- have knowledge in human- and natural sciences, especially such knowledge which has consequences for design of computerized systems.
- have knowledge about industrial entrepreneurship and relevant legislation.

Skills and abilities

The programme has the goal that a Master of Computer Science and Engineering should:

- have prerequisites and abilities to participate in and develop the practices which are applied in industry, administration, and academic research.
- have the ability to independently define and solve computer-related construction problems.
- have the prerequisites for successful work in international and multidisciplinary project groups which consist of people from both technical and non-technical backgrounds. This includes the ability to orally, and in writing, present as well as argue in Swedish and English.

Ability to make judgements and adopt a standpoint

The programme has the goal that a Master of Computer Science and Engineering should:

- Independently analyse and adopt a standpoint on economical, societal, environment-related and ethical consequences of computer science applications, and to design systems concerning this.
- Through self-development, retain one’s professional abilities during a professional career.
- Follow and promote the discussion concerning technology in society.

Extent and content of the programme

The Master of Computer Science and Engineering is composed of 300 ECTS credits, which, at normal study rate, corresponds to 5 years of full-time study (10 semesters). The first three years (180 ECTS credits) are on undergraduate level. The final two years (120 ECTS credits) the student follows one of the following master programmes.
Master's programmes for a Degree of Master of Science in Engineering, Computer Science:

- Computer Science
- Machine Learning
- Interactive Media Technology
- Information and Network Engineering
- Systems, Controls and Robotics
- Communications systems
- Embedded Systems
- Software Engineering of Distributed Systems
- Industrial Management
- Applied Computational Mathematics
- Medical Engineering
- ICT Innovation

*The selection of elective master's programmes can be changed.*

**Language of instruction**

The language of instruction, during the first three years of the programme is mostly in Swedish, although English literature will be used. The concluding two years are taught in English.

**Eligibility and selection**

General admission requirements and the following special admission requirement must be fulfilled in order to be admitted: Mathematics 4/Mathematics E, Physics 2/Physics B and Chemistry 1/Chemistry A, with the lowest grade E/Approved.

Selection is based on high school grades and results of the university examination, two thirds of the places are appointed on the basis of grades and one third on the basis of the university degree.

**Implementation of the education**

**Structure of the education**

Each academic year consists of two semesters which are 20 weeks each, and each semester is further divided into two study periods.

The syllabus for the Master of Computer Science and Engineering programme consists of:

- courses in study year 1–3, concluded by a degree project at undergraduate level,
- courses in study year 4-5 within the chosen master's programme, of which at least 60 credits must consist of courses in computer science at second cycle. Year 5 is concluded by a degree project in second cycle.

**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.

The grading scale is found in the course syllabus.

**Conditions for participation in the programme**

Participation requires admission to courses within the programme, and course registration.
For further studies, special admission requirements for the course are to be fulfilled. Special admission requirements are listed in the respective course syllabus.

**Degree project**

The degree project is the final part of the education. The project work may begin when special admission requirements for the course are fulfilled.

In addition the following applies:
For a student who within the selected Master programme does a degree project examined by any other school than EECS, the programme director for the Master of science of engineering programme in Computer Science and Engineering must approve the specification and the final report to certify the relevance of the degree project in relation to the programme.

**Degree**

Degree of Master of Science in Engineering

Students may apply for the following degrees: Degree of Master of Science in Engineering, Degree of Bachelor of Science and Degree of Master of Science (Two Years), if the requirements for this degree are fulfilled.

**Conditions for the Degree of Master of Science in Engineering 300 ECTS credits**

The Master of Science in Engineering degree is received after completing the programme. The programme is designed so that the student fulfills the national degree requirements and has completed courses corresponding to 300 ECTS credits, including:

- mathematics/natural science subjects must carry at least 45 credits, and in addition at least 180 credits (including a 30-credit degree project) must be within the framework of the engineering area,
- at least 90 credits at second level, of which at least 60 credits (including a 30-credit degree project) must be within the framework of the engineering area.

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

Degree Programme in Computer Science and Engineering (CDATE), Programme syllabus for studies starting in autumn 2019

**General courses**

**Year 1**

**Mandatory courses (64.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA1600</td>
<td>Writing in the Engineering Profession</td>
<td>4.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1337</td>
<td>Programming</td>
<td>7.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1338</td>
<td>Algorithms and Data Structures</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1349</td>
<td>Project in Introduction to Computer Science</td>
<td>3.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1390</td>
<td>Programme Integrating Course in Computer Science Engineering</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1396</td>
<td>Parallel and Concurrent Programming in Introduction to Computer Science</td>
<td>3.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DH1620</td>
<td>Human-Computer Interaction, Introductory Course</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1547</td>
<td>Numerical Methods, Basic Course</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1624</td>
<td>Algebra and Geometry</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1625</td>
<td>Calculus in One Variable</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1671</td>
<td>Mathematics, Basic course, with Discrete Mathematics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

The introductory course in mathematics can **not** be included in the degree.

**Year 2**

**Mandatory courses (57.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD1351</td>
<td>Logic for Computer Scientists</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1362</td>
<td>Programming Paradigms</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>Course code</td>
<td>Course name</td>
<td>Credits</td>
<td>Edu. level</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>DD1368</td>
<td>Database Technology</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1390</td>
<td>Programme Integrating Course in Computer Science Engineering Of which 3 credits belong to study year 2.</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1393</td>
<td>Software Engineering</td>
<td>10.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>IS1500</td>
<td>Computer Organization and Components</td>
<td>9.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>ME1010</td>
<td>Organization and Knowledge-Intensive Work</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1924</td>
<td>Probability Theory and Statistics</td>
<td>6.0</td>
<td>First 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>DD1354</td>
<td>Models and Simulation Either DD1354 or SF1626 must be taken</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1626</td>
<td>Calculus in Several Variable Either DD1354 or SF1626 must be taken</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

*Subject to changes.*

**Year 3**

**Mandatory courses (50.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL1504</td>
<td>Sustainable Development for Computer Science and Engineering</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD1390</td>
<td>Programme Integrating Course in Computer Science Engineering Of which 1 credit belong to study year 3.</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD142X</td>
<td>Degree Project in Computer Science, First Cycle</td>
<td>15.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>DD2350</td>
<td>Algorithms, Data Structures and Complexity</td>
<td>9.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ID1200</td>
<td>Operating Systems</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1688</td>
<td>Discrete Mathematics</td>
<td>6.0</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

*Subject to changes.*

**Year 4**

**Year 5**
Appendix 2: Specialisations

Degree Programme in Computer Science and Engineering (CDATE), Programme syllabus for studies starting in autumn 2019

This programme has no specialisations.