Programme syllabus

Degree Programme in Computer Engineering and Economics
Högskoleingenjörsutbildning i datateknik och ekonomi

180.0 credits

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

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

Programme objectives

The interdisciplinary programme in Computer Engineering and Economics prepares the student for today and tomorrow’s ever more result-oriented businesses and organisation structures. The programme’s goal is to combine a Computer Engineer’s competencies with meaningful knowledge within business economy.

The Bachelor of Science in Computer Engineering educates the student for work within a broad field of technical professions consisting of computer science, programming, communication, project leadership, etc.

The programme has a theoretical-practical profile, and after graduation, the student should be able to work in the usage and introduction of new technology with regards to forming products, processes and work environments. The important aim of the programme is to provide the student with awareness of how technology affects society with regards to the human condition and need, and about society’s goals with regards to resource usage, economy, and environment.

In order to be able to follow the ever faster technical development and the changes it results in, the student must acquired the ability to delve into a new technical area and be given a good basis for continuous personal development and “life-long learning” both within the main area and new subject areas.

After the programme, the student should:

- show the ability to, with suitable methods, model, simulate, plan and execute a work within given time constraints and critically evaluate methods and results.
- show the ability to independently define, formulate and solve problems
· show the ability to work in a multi-cultural and multi-disciplinary project groups which include engineers as well as non-engineers.

· show knowledge about industrial enterprising and about relevant legislation

· show knowledge about effects of human works for humans and the environment

· show the ability to work with current qualitative and quantitative economical estimation methods which are used in technology-oriented businesses

· show knowledge about the technical and economical conditions for industry businesses and their relations to their marketing participants

· show the ability to judge capital need in the short and long term and compile bases of decisions in order to finance development and expansion in a smaller company

**Knowledge and understanding**

- have knowledge of Information Technology's scientific base as well as solid experience and awareness of current development and research
- have a broad proficiency in computer and communication technologies and in-depth knowledge of the chosen specialization
- have knowledge of Computer Engineering and Data Communication from a system perspective, with emphasis on applied technology.
- understand the role of the engineer
- have knowledge of social, environmental, cultural and business aspects and the effects that information and communication systems have on these

**Skills and abilities**

- be able to apply knowledge of Information Technology to solve technical problems
- be able to apply knowledge of programming and Communication Technology for the development, operation and maintenance of hardware, network administration and internet-based services
- be able to apply mathematics and science within Information Technology
- be able to use a creative and critical work-ethic to identify, formulate and solve problems in the field of Computer Engineering with the appropriate methods and tools
- be able to work independently and within the specific framework of engineering projects in the field of Computer Technology
- show the ability to work cooperatively, organise, and be a project leader
- show sound communication ability, both verbally and in writing, in English and Swedish, in the context of engineering

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

- show ability and insight in the importance of teamwork and cooperation in multidisciplinary and culturally diverse project groups
- show understanding of and respect for the impact that Information Technology has on people, society and the environment
be able to evaluate IT systems, not only from a technical aspect but also from ethical, cultural and economic aspects

Information with regard to the degree requirements for the Bachelor of Science in Engineering degree are presented in KTH's Degree ordinance:

http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina/1.27227

**Extent and content of the programme**

The education comprises 180 HE credits, which corresponds to 3 years of full-time studies.
The level of the education is mainly for first-cycle studies.
The teaching is mainly in Swedish.
Certain courses and parts of courses are taught in English.

**Eligibility and selection**

To study at KTH, the general entry requirements for higher education apply. Furthermore, the following specific entry requirements must be fulfilled for admission to KTH's engineering programmes: Mathematics D, Physics B and Chemistry A, or equivalent. For each of the subjects, a grade of at least Pass or 3 is required. Other studies or professional experience is assessed based on the prior knowledge required.

For more information, refer to KTH's admission regulations found in KTH's regulatory framework, www.kth.se

**Implementation of the education**

**Structure of the education**

Most of the courses in the programme comprise 7.5 higher education credits, which are graded on a scale of A-E, F and Fx. The study year is normally divided into 4 study periods and, normally, two courses are taken in parallel every study period. The lectures, as well as the examination form vary from course to course. Normally, a portion of the course is constituted of lectures, which give first contact with concepts and theories. Exercises and labs strengthen the understanding of the theoretical connections. In accordance with the model from industry, project work plays an essential role in the education. Training is given to be able to, in a group, work with reality-related assignments in an engineering-related manner.

The programme consists of obligatory courses during the first two years. In order to create a wholeness in the programme, the collaboration between courses within every study year as well as between study courses is emphasized.

In Computer engineering and economy, the economy courses are integrated, and, like many of the technical courses, often with help of different technology-oriented companies. Economy comprises five courses, a total of 37.5 higher education credits.

The programme is concluded with a degree project which normally takes place outside the school.
Term 1

The programme starts with the first term which, beyond an engineering introduction consists of three courses within economy. Calculation and entrepreneurship, marketing, and external accounting are courses which cover the knowledge which traditional economy studies give, but with the technical business as a starting point and the knowledge in the interface between technology and the economy.

Terms 2-3

The 4th economy course Financing and organisation theory is given in the beginning of term 2.

A fundamental programming course, computer communication and networks, digital and micro-computer technology, two mathematics courses and a technical project are the core of the basic courses which belong to the first year of the computer engineering programme. This is described more extensively in appendix 3.

Terms 4,5-6

During the period, the studies within computer engineering are deepened. During the terms, three courses which are common to all programmes: Environmental and work science, Economy and organisation, and the course Competence and development which aims to prepare the student for a future professional role. The course focuses on non-subject specific areas such as personal and professional development, and reflection over the coming professional role.

During the period, the 5th economy course Applied Industrial economy is given. The course integrates the technical knowledge with business economical model-thinking and methodology. The course gives engineers further support to participate in society’s development. The students are strengthened in their professionalism in applying business economical models in collaboration with technical specialist knowledge. Technical processing space is given broader economic perspective

When the students start the 6th and final term, they have 37.5 higher education credits in business economy.

The programme is concluded with a degree project within the specialisation’s educational area. It is carried out independently or together with another student. The aim with the degree project is that you will have the chance to show the knowledge and abilities which you have acquired during the programme.

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
After 3 study terms, at least 60 higher education credits must be completed before the next term may be started. For students who do not fulfill this requirement, an individual study plan must be created in collaboration with the study guidance.

After 5 study terms, at least 105 higher education credits must be completed before the next term may be started. For students who do not fulfill this requirement, an individual study plan must be created in collaboration with the study guidance.

**Recognition of previous academic studies**

The student has the right to receive credit for education from another higher education institution/university within Sweden or abroad. The condition is that the course(s) are of such a nature and have such content that they correspond to the learning outcome goals which apply for the programme. Recognition of an entire course is approved by the GA. Elements of a course can be approved by the examiner.

**Studies abroad**

Students at the School of Technology and Health (STH) have the possibility to allocate one study year to studies abroad at a foreign institute with which KTH collaborates without having to pay the normal study fee which is possibly required by native students. Exchange studies can be done during the third study year. It is also possible to carry out the degree project abroad. Information about studies abroad is provided by supervisor for internationalisation who also informs about application deadlines. Application forms can be found at the study guidance office. Studies abroad can, after evaluation, be counted as a portion of the Bachelor of Science in Engineering programme. The student must, together with the school, build a so-called “Learning Agreement” which entails approval of the exchange studies in advance. The studies are normally instructed in the language which is spoken in the region or country. There are possibilities for one whom is accepted to the exchange programme in German, French, Spanish, and Italian speaking countries to take a prepared language course before the regular term starts.

**Degree project**

In the programme, a degree project comprising 15 higher education credits is included. This corresponds to about 10 weeks of full-time studies. See more, Guidelines for the degree project, The School for Technology and Health.

*For the degree project, the following apply:*

- It may be started at the earliest after 120 higher education credits are completed, and when all courses relevant to the degree project’s content are completed.
- It may be started after the assignment is approved by the examiner.
- It is based in the knowledge which has been acquired during the time of study and must normally be carried out during term 6.
- It must show proof of an independent work comprising theoretical and/or experimental work, and a relevant written report and oral presentation.
- The instructor is appointed by the specialisation leader or examiner.

**Degree**
In order to receive a Degree of Bachelor of Science in Engineering, degree programme in Computer Engineering and Economics, all courses in the study plan must be completed. The study plan consists of obligatory courses, optional courses and the degree project, and comprises at least 180 higher education credits.

Courses which, content-wise, overlap other courses in the programme may not be counted towards the 180 higher education credits which comprise the degree.

The student applies for the degree on a form and attaches receipts for the paid student union fees.

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

Degree Programme in Computer Engineering and Economics (TIDEA), Programme syllabus for studies starting in autumn 2011

General courses

Year 1

Mandatory courses (60.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1026</td>
<td>Digital Electronics</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1028</td>
<td>Computer Engineering</td>
<td>8.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HF1005</td>
<td>Engineering and Information Skills</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HF1006</td>
<td>Linear Algebra and Calculus in One Variable</td>
<td>10.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HF1007</td>
<td>Environmental Science and Work Science</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1024</td>
<td>Computer Programming, Basic Course</td>
<td>8.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1025</td>
<td>Operating Systems</td>
<td>7.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1026</td>
<td>Computer Engineering and Internet Technology, Project Course</td>
<td>9.0 hp</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

Year 2

Mandatory courses (60.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1031</td>
<td>Economics and Organizational Theory</td>
<td>7.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1033</td>
<td>Communication Networks</td>
<td>7.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HF1012</td>
<td>Mathematical Statistics</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HF1013</td>
<td>Discrete Mathematics</td>
<td>8.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1027</td>
<td>Object Oriented Programming</td>
<td>8.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1028</td>
<td>Software Development, Project Course</td>
<td>9.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1029</td>
<td>Algorithms and Data Structures</td>
<td>8.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>HI1030</td>
<td>Database Technology</td>
<td>7.0 hp</td>
<td>First cycle</td>
</tr>
</tbody>
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Appendix 2: Specialisations

Degree Programme in Computer Engineering and Economics (TIDEA), Programme syllabus for studies starting in autumn 2011

This programme has no specialisations.