Programme syllabus

Degree Programme in Electrical Engineering and Economics
Högskoleingenjörsutbildning i elektroteknik och ekonomi

180.0 credits

Valid for students admitted to the education from autumn 09 (HT - Autumn term; VT - Spring term).

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

Programme objectives

In addition to the aims that are specified in the higher education ordinance, the following aims apply for engineers who are graduated from Electrical Engineering and Economics at KTH...

Knowledge and understanding

- show the knowledge and ability required to work independently as an engineer in computer technology and electronics
- show knowledge about the technical and economic conditions that are set for an industrial concern and its relation to its market actors

Skills and abilities

- show ability to independently and creatively identify, formulate and solve problems in electrical engineering fields
- be able to apply acquired knowledge in analogue and digital technology, programming and automatic control in design and maintenance of embedded products and systems
- show basic knowledge in mathematics, and ability to critically and systematically use knowledge to model, simulate or evaluate developments based on relevant information
- show broad expertise in mechatronical systems and a good understanding of the possibilities and limitations of robot technology
- show ability to work with current qualitative and quantitative economic calculation methods that are used in technology oriented companies
- show ability to assess capital requirement in the short and long term, and compile decision-making basis to finance development and expansion in smaller companies

Ability to make judgements and adopt a standpoint

- show ability for, and an understanding of, the importance of teamwork and cooperation in multicultural and multi-disciplinary project groups
- show ability to handle and shape products, processes and systems from technical, ethical and economic aspects
- show knowledge about how the design of products systems is best adapted to human wishes and needs and with regard to environmental aspects

KTH's local degree ordinance can be found in KTH's regulatory framework. www.kth.se

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, 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, 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**

Academic year, semesters and study periods are described in KTH's regulatory framework, www.kth.se

Most of the courses in the programme comprise 7.5 HE credits, graded in a seven point grading scale, A-E, F and Fx. The academic year is normally divided into 4 study periods, and normally two courses are read in parallel during each study period. The teaching and examination forms vary from course to course. Normally, a part of the course consists of lectures that provide an introduction to concepts and theories. Practical assignments and laboratory sessions reinforce the understanding of the theoretical relationships. Project work according to models from the industry has an essential role in the education. Here, training is given to work in groups with reality-based assignments with an engineering approach.

The education consists of compulsory courses during the first years. In order to create wholeness in the education, cooperation between the courses is emphasised, both within each year and between the years. In the programme, actual examples from different technology-oriented companies are integrated in the economic courses, as well as in many of the technical courses. The Economics part comprises five courses, total 37.5 HE credits.

The education is completed during the final semester with a degree project that is usually carried out with employers outside of school.

*Semester 1 of the degree programme in Engineering and Economics*

The education begins with a first semester that comprises four courses in economics. Business Calculation and Entrepreneurship, Marketing, External Accounting and Business Finance and Organizational Structures are courses that cover the knowledge that traditional economic studies give, but with technology companies as a starting point and knowledge in the cross-section between technology and economics.

*Semester 2-3*

The studies begin with an introductory course in project methods to give the basis for project work, which is an essential part of all education. A basic programming course, Digital and Micro Computer Technology, two mathematical courses, Design Methods and a technical project constitute the core of basic courses belonging to the first year of the electrical engineering education.

*Semester 4-6*

During the period, the studies in the electrical engineering field are deepened in the form of the courses Analogue Technology, Applied Electronics, Sensors and Measurement Technology and Automatic Control. In addition, the course Dynamics is read to support the following mechatronics project, which integrates knowledge from the earlier
courses. During the semesters, two courses that are common to all programmes are also read: Sustainable Development and Working Environment as well as Engineering Practice and Development, which intends, in a general sense, to prepare for the future professional role. The course focuses on non-subject-specific fields, such as personal and professional development and reflection on the future professional role.

The 5th economics course, Industrial Business Economics, is given during this period. The course integrates technical knowledge with business economic model-thinking and methodology. The course gives the engineer additional support to participate in the social progress. The students are strengthened in their professionalism to be able to apply business economic models in collaboration with the technical specialist knowledge. Technical scope for action is given a broader economic perspective.

When the students start their 6th and final semester, they have completed 37.5 HE credit points in business management and complete their studies with an elective course within the specialisation and a degree project.

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
Enrolment
A precondition for participating in the studies is that the student each spring and autumn must enrol for the coming semester. This is done according to KTH's instructions.

With the enrolment, the student has reported the intention to study and participate in the education. After that, it is possible for the student to:

- register for the semester
- register for courses
- get results reported
- have the possibility to receive student aid from CSN

Course application
Course applications within the programme are made by the student before each semester according to KTH's instructions.

Conditions for participation in the education
For students who have completed one spring semester with mainly economics courses as a combination subject, the following applies:

- After 3 semesters of total studies, at least 60 HE credits should be completed before the next semester is started. Students who do not fulfil this requirement should establish an individual study plan in consultation with a study adviser
- After 5 semesters of total studies, at least 105 HE credits should be completed before the next semester is started. Students who do not fulfil this requirement should establish an individual study plan in consultation with a study adviser

The student is responsible for making sure that any prior knowledge from earlier courses in the education has been achieved before the new course. Information about entry requirements can be found in the respective course syllabus.
Recognition of previous academic studies

Students may apply to credit results from course/courses at other higher education institution/university in or outside of the country. Application can be found on KTH’s website.

KTH's policy for inclusion can be found in full in KTH's regulatory framework. www.kth.se

Studies abroad

Students at the Degree Programme in Electrical Engineering and Economics have the opportunity to study abroad through the agreements KTH has with universities within and outside of the EU. Exchange studies may normally not be done during the first or second year. It is also possible to carry out the degree project abroad.

Application deadline for studying abroad is around the 15th of January.

Degree project

The degree project comprises 15 HE credits.

The following applies for the degree project:

- It may be started, at the earliest, after having achieved 120 HE credits and when final grades exist in relevant courses that concern the contents of the degree project.
- It may be started after that the assignment has been approved by the examiner.
- It is based on the knowledge that has been acquired during the education and should normally be carried out during semester 6.
- It should constitute proof of an independent work comprising theoretical and/or experimental work with accompanying report writing and oral presentation.
- The supervisor is appointed by the examiner

KTH’s rules for degree projects can be found in KTH’s regulatory framework, www.kth.se

Degree

To complete an English Bachelor of Science in Engineering, Degree Programme in Electrical Engineering and Economics, passing grades in all courses that are included in the student's study plan are required. The study plan consists of the compulsory courses, the elective courses that the student has opted for and the degree project. The study plan should comprise at least 180 HE credits.

KTH’s local degree ordinance can be found in KTH’s regulatory framework, www.kth.se

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

Degree Programme in Electrical Engineering and Economics (TIEEA), Programme syllabus for studies starting in autumn 2009

Electronics, Robotics and Mechatronics (EROS)

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>HE1004</td>
<td>Digital Electronics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1005</td>
<td>Computer Engineering</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1006</td>
<td>Design Methods</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1007</td>
<td>Mechatronics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HN1001</td>
<td>Applied Mathematics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HN1900</td>
<td>Engineering and Information Skills</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HN1901</td>
<td>Mathematics I</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1300</td>
<td>Computer Programming Basic Course</td>
<td>7.5</td>
<td>First cycle</td>
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Year 2

Mandatory courses (60.5 credits)

<table>
<thead>
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<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1008</td>
<td>Analogue Technology</td>
<td>7.5</td>
<td>First cycle</td>
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<tr>
<td>HE1009</td>
<td>Applied Electronics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1010</td>
<td>Sensors and Measurement Technology</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1011</td>
<td>Control Systems</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1012</td>
<td>Mechatronics 2, Project</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HE1017</td>
<td>Dynamics</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>HU1901</td>
<td>Engineering Practice and Development</td>
<td>7.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>MJ1506</td>
<td>Sustainable Development and Working Environment</td>
<td>8.0</td>
<td>First cycle</td>
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</table>
Year 3

Mandatory courses (30.0 credits)

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<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
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<tbody>
<tr>
<td>HE1015</td>
<td>Robotics</td>
<td>7.5</td>
<td>First cycle</td>
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<tr>
<td>HE1024</td>
<td>Real Time Systems</td>
<td>7.5</td>
<td>First cycle</td>
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<td>HE102X</td>
<td>Degree Project in Mechatronics and Robotics, First Cycle</td>
<td>15.0</td>
<td>First cycle</td>
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Appendix 2: Specialisations

Degree Programme in Electrical Engineering and Economics (TIEEA), Programme syllabus for studies starting in autumn 2009

Electronics, Robotics and Mechatronics (EROS)