Programme syllabus

Degree Programme in Industrial Technology and Sustainability
Civilingenjörsutbildning i industriell teknik och hållbarhet

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

In addition to the objectives specified in the Swedish Higher Education Ordinance, a graduate Master of Science in Engineering in Industrial Technology and Sustainability at KTH shall have the following knowledge, skills and judgement abilities:

Knowledge and understanding

• demonstrate broad knowledge within the chosen technical field, including knowledge in mathematics and natural science, and substantial specialised knowledge within certain parts of the field
• possess good knowledge and expertise in the issues and areas of sustainable development, gender equality, equal opportunities and diversity
• have a broad scientific foundation that enables them to work within a chosen technical field
• possess extensive technical and mathematical knowledge applied to engineering of production systems, logistics and maintenance
• have substantial applicable scientific knowledge about human factors and ergonomics relevant for work within production, logistics and maintenance
• demonstrate in-depth knowledge in production development for sustainable environment, work and business with a production system perspective

Skills and abilities

• demonstrate a good ability to, independently and in a group, apply knowledge and skills in practice while taking into account relevant scientific, professional/profession-related and societal assessments and standpoints
• demonstrate proficiency in being able to formulate, analyse, evaluate and manage technical problems and issues from a systems perspective, with a holistic view of their life cycle, from concept/requirements to specification, development, operation and decommissioning, and an ability to set boundaries, minimise necessary resource consumption and manage processes for problem-solving/realisation
• show some ability to lead operations at different organisational levels, in different types of
organisational life-cycle stages, within different types of logical frameworks
• possess the requisite personal and professional skills, such as in the area of language, leadership, project management, sustainable systems analysis, gender equality, equal opportunities and communication, to work as an engineer in a management position or as a leader within a technology-intensive company
• demonstrate proficiency in applying mathematically-based methods for analysing, modelling, optimising and evaluating industrial technology, processes and flows in the areas of production, logistics and maintenance with respect to sustainability
• demonstrate an ability to integrate technical and human aspects within socio-technical systems, for overall system performance and sustainability

Ability to make judgements and adopt a standpoint

• have a particularly good understanding of the fact that engineering problems are often complex, can be incompletely defined and sometimes involve conflicting conditions
• adopt a reflective approach
• demonstrate accountability with regard to issues within technical, organisational, economic, ecological and societal systems

Extent and content of the programme

The Degree Programme in Industrial Technology and Sustainability comprises 300 higher education credits, which corresponds to 5 years of full-time studies at a normal study pace (10 semesters).

The programme's first three years (180 credits) are primarily first cycle.

During the two final years (120 credits), the student undertakes a Master's programme. Master's programme courses are conducted primarily in the second cycle.

Following Master’s Programmes leads to a Degree of Master of Science in Industrial Technology and Sustainability:

- Sustainable production development
- Sustainable energy engineering
- Industrial management
- Production engineering and management
- Applied and computational mathematics
  - track Optimization and system theory (OPSA)

*The range of offered Master's programmes may be revised. An updated list of elective Master's programmes can be found on the KTH student web for each respective academic year.

For students undertaking any of the following Master's programmes:

Sustainable energy engineering, Industrial management, Applied and computational mathematics a complementary technical course profile is required to be examined in the programme Industrial technology and sustainability.
Language of instruction

The language of instruction for the first three years of first cycle is mainly Swedish, but English literature is common. The courses in the final two years are mostly conducted in English.

Eligibility and selection

Admission to the Degree Programme in Engineering in Industrial Technology and Sustainability requires the general entry requirements for higher education, and also special admission requirements as follows:

**Upper-secondary education before 1 July 2011 and upper-secondary adult education before 1 July 2012**

Field-specific entry requirement 9

**Specific admission requirements corresponding to:**
Mathematics E, Physics B and Chemistry A.
In each of the subjects, a minimum grade of Pass or 3 is required.

**Upper-secondary education from 1 July 2011 and upper-secondary adult education from 1 July 2012 (Gy11/Vux12)**

Field-specific entry requirement A9

**Specific admission requirements corresponding to:**
Mathematics 4, Physics 2 and Chemistry 1. A grade of E is required as a minimum in each of the subjects.
* For more information on field-specific entry requirements, see www.uhr.se

For entry requirements and selection principles, see the KTH admission regulations - Admissionorder

Implementation of the education

Structure of the education

Every academic year comprises two semesters of 20 weeks each. Every semester in divided into two periods.

**Years 1-3, studies at first cycle**

The programme is organised around courses in applied subjects relating to mathematics, engineering science and technology. The teaching and use of professional skills and abilities of great importance to a certified engineer, for example, corporate and societal aspects, communication and sustainable development, are integrated into the courses.

To create a unified whole, the programme emphasises cooperation between different subjects, both within a specific year and between years. This is achieved through courses being coordinated on the schedule, via joint degree projects and written assignments.

The first 3 years conclude with a degree project for a Degree of Bachelor worth 15 credits within a chosen technical field. After successfully completing 180 credits, the student can apply for a technical Degree of Bachelor. If the qualification requirements are met, a Degree of Bachelor of Science is obtained.
Mathematical natural science courses

This block contains basic courses in mathematics and natural science and is mainly located in year 1 and year 2.

Technology courses

For the Master of Science in Engineering in Industrial Technology and Sustainability this is a block of core and basic technology courses for production, logistics, maintenance and ergonomics as well as systems engineering applied to production systems. These courses are given from year 1, through year 3.

Years 4-5 Studies at second cycle

Year 4 through year 5 in the Master of Science in Engineering in Industrial Technology and Sustainability is given as a masters programme and consists of specialised studies within a particular technology subject area at advanced level.

The education ends with a master thesis project work at advanced level for 30 ECTS, equivalent of 20 weeks of full time studies. There are certain requirements specified for when a master thesis project, at second cycle, may start. More information is found in the course plan for the thesis project course.

Courses

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

The programme consists of compulsory, conditionally elective, recommended and optional courses. The compulsory courses are defined for each year in course lists. The goals, entrance qualifications, content and course requirements for each course can be found in the official course syllabuses.

The forms of teaching and examination vary between courses. These are indicated in each official course syllabus.

The program includes mandatory and elective courses. The obligatory courses are defined for each year of study in the course listings. The different course objectives, eligibility requirements, content and course requirements are found in the curricula.

Teaching and examination methods vary between courses, and are specified in the syllabus.

For elective courses, the following restrictions apply:

• Elective course must not be read during the first year
• The number of credits which may be chosen per semester is limited to 35 credits
• Elective course may not correspond to an existing program course to a significant extend
• University preparatory courses may not be selected as an elective course
• Elective course can be selected freely, but should be relevant to the profession as an engineer

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

Participation requires admission to courses within the programme and course registration.

For continued studies there are specific admission requirements for the courses. Admission requirements are specified in the course syllabus.

Degree project

Degree project, first cycle

Year 3 in the spring term of the programme includes a degree project which is a course of 15 credits.

The project work may begin when special admission requirements for the course are fulfilled.

Degree project, Second Cycle

The Degree Programme in Industrial Technology and Sustainability includes a degree project for a Degree in Master of Science in Engineering, which comprises 30 credits.

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

Degree

In order to complete a Degree in Master of Science in Engineering, Degree Program in Industrial Technology and Sustainability, requires an approved grade in all courses included in the students study plan based on the degree programme. The study plan shall comprise 300 credits, which includes a degree project, first cycle comprising 15 credits and a degree project, second cycle comprising 30 credits.

Optional introductory courses and preparatory courses cannot be included as part of the degree.

Courses whose content is similar to one or more other courses within the programme cannot be counted as part of the 300 credits that form the basis for the degree.

Optional courses will contribute to the degree programme Industrial Technology and Sustainability objectives of mechanical engineering and the professional role.

- Title of general qualification at first cycle

Bachelor of Science (180 credits)
Teknologie kandidatexamen

- Title of professional qualifications at second cycle

Master of Science in Engineering
Civiliingenjörsexamen

- Title of general qualification at second cycle
Master of Science (120 credits)
Teknologie masterexaman

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

Degree Programme in Industrial Technology and Sustainability (CITEH), Programme syllabus for studies starting in autumn 2019

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>ML1500</td>
<td>Introduction to Industrial Technology</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1501</td>
<td>Industrial Systems I</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1502</td>
<td>Sustainabililty for Industry</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1624</td>
<td>Algebra and Geometry</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1625</td>
<td>Calculus in One Variable</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1626</td>
<td>Calculus in Several Variable</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SG1117</td>
<td>Engineering Mechanics</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SK1117</td>
<td>Electromagnetism and Waves</td>
<td>7.5 hp</td>
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Year 2

Mandatory courses (63.0 Credits)

<table>
<thead>
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<th>Edu. level</th>
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<tbody>
<tr>
<td>DD1310</td>
<td>Programming Techniques</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ME1003</td>
<td>Industrial Management, Basic Course</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MJ1112</td>
<td>Applied Thermodynamics</td>
<td>9.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1018</td>
<td>Fundamental Industrial Statistics</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1503</td>
<td>Industrial Systems II</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1504</td>
<td>Logistics in Production</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1505</td>
<td>Industrial Systems III</td>
<td>9.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1506</td>
<td>Adaption course for Industrial Technology</td>
<td>3.0 hp</td>
<td>First cycle</td>
</tr>
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</table>
Year 3

Mandatory courses (36.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
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<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF1546</td>
<td>Numerical Methods, Basic Course</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1633</td>
<td>Differential Equations I</td>
<td>6.0 hp</td>
<td>First cycle</td>
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<tr>
<td>DD1320</td>
<td>Applied Computer Science</td>
<td>6.0 hp</td>
<td>First cycle</td>
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<tr>
<td>ML1507</td>
<td>Communicating Engineer</td>
<td>3.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1508</td>
<td>Dependability and Operational Maintenance</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML150X</td>
<td>Degree Project in Industrial Technology and Sustainability, First Cycle</td>
<td>15.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1811</td>
<td>Optimization</td>
<td>6.0 hp</td>
<td>First 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>ME2015</td>
<td>Project Management: Leadership and Control</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>ME2063</td>
<td>Team Leadership and Human Resource Management</td>
<td>6.0 hp</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MF1017</td>
<td>Basic Electrical Engineering</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MG1002</td>
<td>Automation Technology</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MG1016</td>
<td>Manufacturing Technology</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>MJ1401</td>
<td>Heat Transfer</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1632</td>
<td>Complementary Course in Differential Equations and Transforms</td>
<td>3.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1904</td>
<td>Markov Processes, Basic Course</td>
<td>3.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SF1915</td>
<td>Probability Theory and Statistics</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>SG1220</td>
<td>Fluid Mechanics for Engineers</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
</tbody>
</table>
Appendix 2: Specialisations

Degree Programme in Industrial Technology and Sustainability (CITEH), Programme syllabus for studies starting in autumn 2019

This programme has no specialisations.