Programme syllabus

Degree Programme in Industrial Technology and Production Maintenance
Högskoleingenjörsutbildning i industriell teknik och produktionsunderhåll
180.0 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 engineer from Industrial Technology and Production Maintenance at KTH shall:

Knowledge and understanding

• demonstrate substantially deeper knowledge of maintenance engineering, the scientific basis, industrial practices and proven experience and knowledge of ongoing research and development.
• demonstrate broad knowledge in reliability and industrial sustainability and adequate knowledge in mathematics and science.
• demonstrate broad knowledge within social, economic and ecological sustainability and lifecycle aspects from a reliability and maintenance perspective.
• demonstrate deep understanding in the field of sustainable production systems and its economic, social and environmental aspects

Skills and abilities

• from a holistic perspective demonstrate the ability to identify and formulate problems and present, analyze and evaluate different solutions in maintenance, reliability and industrial sustainability.
• demonstrate the skills to evaluate activities related to maintenance, reliability and industrial sustainability with respect to technical, economic, environmental and social aspects of resource management
• demonstrate the ability to utilize and introduce new technologies when designing systems, production flows and processes for sustainable production
• demonstrate the skills to plan and with adequate methods carry out tasks within the given framework, working both independently and in groups
• demonstrate the ability to critically and systematically model, simulate, predict and evaluate developments based on relevant information and in addition make relevant risk assessments.
• demonstrate the ability to design products, processes and systems with regard to human conditions and needs and society's objectives for economically, socially and ecologically sustainable development
• demonstrate the ability to work and show understanding of the importance of collaboration within multidisciplinary teams

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

• show the ability to make judgments with regard to relevant scientific, social and ethical aspects
• show insight into the potentials and limitations of technology, its role in society and the responsibility for its use, including social and economic aspects as well as environmental and safety aspects

KTH's local Degree Ordinance is found in the KTH regulatory framework, www.kth.se

**Extent and content of the programme**

The programme comprises 180 higher education credits, which corresponds to three years of full-time studies.
The programme level is primarily first cycle.
The language of instruction is mainly Swedish. Some courses and course components may be taught in English, and certain course literature is in English.

**Eligibility and selection**

To study at KTH, the general entry requirements for higher education apply. In addition, the following specific entry requirements must be fulfilled for admission to KTH's engineering programmes: Field-specific entry requirement A8 (Physics 2, Chemistry 1, Mathematics 3c). Other studies or professional experience are assessed based on the prior knowledge required.

**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.

**Structure of the programme**

Teaching and examination forms vary from course to course. Normally part of the course consists of lectures which introduce students to concepts and theories. Exercises and laboratory work reinforce the understanding of the theoretical relationships. Engaging in project work according to an industry model plays a vital role in the programme. This provides group training in addressing reality-based tasks in an engineering way.

The programme consists of compulsory courses for the first two years. To create a unified whole, the programme emphasises cooperation between courses, both in a specific year and between years. Three
specialisations are offered within the programme; Industrial Engineering and Production, Innovation and Design, and Robotics and Mechatronics.
The programme is concluded in the final semester with a degree project, which is often carried out with an employer outside the school.

Year 1

An introductory course provides the student perspectives on the field of study, the role of the engineer, the basics of working in project form and group dynamics. The students take basic courses in mathematics, production, materials, programming, mechanics, maintenance engineering, reliability and environmental technology.

Year 2

During the second year the students take courses in engineering sciences and applied subjects like solid mechanics, electrical engineering and electronics, machine components, automation, energy technology, and further specialization in maintenance and sustainable production. They take also complementary courses in production economy for sustainability, work organization, and performance management and leadership.

Year 3

During the third year, the students read a larger, specialisation specific project course and advanced courses in maintenance, reliability and the related asset management systems. Two elective courses have to be taken. The programme concludes with a degree project.

Courses

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

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**

To obtain a Bachelor of Science in Engineering, Degree Programme in Mechanical Engineering, requires a passing grade in all courses included in the student's study plan. The study plan consists of the compulsory courses, the elective courses that the student has followed and the degree project. The study plan must include at least 180 credits whereof a 15 credit degree project in first cycle is included.

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 180 credits that form the basis for the degree.

- **Title of professional qualifications at first cycle**

  *Bachelor of Science in Engineering (180 credits)*

  Högskoleingenjörsexamen

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

Degree Programme in Industrial Technology and Production Maintenance (TIIPS), 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>AL1106</td>
<td>Environmental Technology and Sustainable Production</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1000</td>
<td>Engineering Mathematics</td>
<td>11.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1101</td>
<td>Mechanics, General Course</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1600</td>
<td>Introduction to Industrial Technology and Production Maintenance</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1601</td>
<td>CAD</td>
<td>4.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1602</td>
<td>Computer Programming, Basic Course</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1603</td>
<td>Materials and Manufacturing, Basic Course</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1604</td>
<td>Applied Statistics, Basic Course</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1605</td>
<td>Industrial Maintenance and Reliability for Sustainable Production</td>
<td>6.0 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>ML1201</td>
<td>Strength of Materials, General Course</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1204</td>
<td>Machine Components</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1607</td>
<td>Electrical and Control Engineering</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1608</td>
<td>Maintenance Economy for Sustainable Production</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>Course code</td>
<td>Course name</td>
<td>Credits</td>
<td>Edu. level</td>
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</tr>
<tr>
<td>ML1609</td>
<td>Quality Technology and Improvement</td>
<td>6.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1610</td>
<td>Work Organization, Business Management and Leadership</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1611</td>
<td>Automation Technology</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1612</td>
<td>Energy Technology in Industrial Production</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1613</td>
<td>Maintenance Management, Specialised Course</td>
<td>7.5 hp</td>
<td>First cycle</td>
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Year 3

Mandatory courses (45.0 Credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
</table>
| ML160X      | Degree Projekt in Industrial Technology and Production
Maintenance, First Cycle                                  | 15.0 hp | First cycle|
| ML1614      | Project Course in Maintenance and Operations for Sustainable
Production                                               | 7.5 hp  | First cycle|
| ML1615      | Reliability and Maintenance in the Smart Factory                | 7.5 hp  | First cycle|
| ML1616      | Industrial Project Management                                   | 7.5 hp  | First cycle|
| ML1617      | Intelligent Maintenance Systems                                  | 7.5 hp  | First cycle|
Appendix 2: Specialisations

Degree Programme in Industrial Technology and Production Maintenance (TIIPS), Programme syllabus for studies starting in autumn 2019

This programme has no specialisations.