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 17 (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

Programme arrangement

Academic years, semesters and study periods are found in the KTH regulatory framework, www.kth.se
If necessary, instruction may be provided outside the parameters of the academic year.
Refer to the composition of academic years in the KTH regulatory framework, www.kth.se

Structure of the programme

The academic year is divided into 4 study periods and normally several courses are read in parallel.
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 (15 credits). 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
• 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.

A seven-grade criterion-referenced grading scale A-F is used for courses at KTH as final grades for courses at first and second cycle. A–E are grades corresponding to a pass, with A being the highest grade. The grades pass (P) and fail (F) are used as final grades when there are special reasons.

**Conditions for participation in the programme**

**Course application and semester registration**

For the autumn semester, semester registration takes place in conjunction with enrolment. Course registration is done by the student via personal login at www.kth.se

A prerequisite for participating in the studies is that, each autumn and spring, the student applies for courses prior to the coming semester. Course application is done via www.antagning.se between 1 and 15 November, and 1 and 15 May, respectively.

If the student does not apply via www.antagning.se, the application is only considered subject to availability.

In addition, the student must complete their semester and course registration in conjunction with each course start via personal login at www.kth.se

Choice of specialisation is made prior to semester 4 in accordance with KTH instructions.

*For studies in year 2:*

At least 45 credits from year 1 should be completed by the end of the examination period in August, according to the course list of the programme syllabus. Students who do not fulfil this requirements must establish an individual study plan together with the study advisor.

*For studies in year 3:*

At least 90 credits from years 1 and 2, which 50 credits must be completed from year 1. They should be completed by the end of the examination period in August, according to the course list of the programme syllabus.

Students who do not fulfil this requirements must establish an individual study plan together with the study advisor.

For degree projects, see the separate heading.

**Individual study plan**

A student who is lagging behind in their studies and does not meet the above requirements must, in consultation with the study advisor for the programme, establish an individual study plan for the
continuing studies. An individual study plan may mean that the student cannot be guaranteed full-time studies. See the KTH regulatory framework: www.kth.se

Recognition of previous academic studies

Students on the Mechanical Engineering Programme have the opportunity to apply to be given credit for results from a course or courses at another higher education institution/university within or outside the country.

As the grading systems differ widely between countries, grades from exchange studies are not translated to the KTH grading scale. The entire KTH policy for credit transfer is included in the KTH regulatory framework, www.kth.se

Studies abroad

Students on the Industrial Technology and Production Maintenance programme have the opportunity to study abroad through agreements KTH has with universities within and outside the EU. Exchange studies normally cannot be pursued during the first or second year. It is also possible to do the degree project abroad.

For the application deadline, see www.kth.se

Degree project

Year 3 of the programme includes a degree project which is a course of 15 credits. Regarding the degree project:

• It may not be commenced until 120 credits have been obtained and when a final grade has been received in relevant courses which concern the content of the degree project
• It may be commenced after the examiner has approved the assignment
• It is based on the knowledge obtained during the study period and is usually carried out in semester 6
• It shall constitute proof of an independent piece of work comprising theoretical and/or experimental activity with an accompanying written report and oral presentation
• Supervisors are appointed by the examiner

KTH's rules for degree projects are found in the KTH regulatory framework, www.kth.se

Degree

The student must personally apply for a certificate. Applications are made by logging on to www.kth.se where “Applications for degrees” is found under the heading “Programme”.

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.
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.

Application for a certificate is done according to KTH instructions, see www.kth.se

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

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 2017

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>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------------------------------------</td>
<td>---------</td>
<td>------------</td>
</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>
</tr>
</tbody>
</table>

Supplementary information

Information is based upon the curriculum for academic year 2018/2019. Changes may occur.

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>
<tbody>
<tr>
<td>ML160X</td>
<td>Degree Projekt in Industrial Technology and Production Maintenance, First Cycle</td>
<td>15.0 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1614</td>
<td>Project Course in Maintenance and Operations for Sustainable Production</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1615</td>
<td>Reliability and Maintenance in the Smart Factory</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1616</td>
<td>Industrial Project Management</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
<tr>
<td>ML1617</td>
<td>Intelligent Maintenance Systems</td>
<td>7.5 hp</td>
<td>First cycle</td>
</tr>
</tbody>
</table>

Supplementary information

Information is based upon the curriculum for academic year 2019/2020. Changes may occur.
Appendix 2: Specialisations

Degree Programme in Industrial Technology and Production Maintenance (TIIPS), Programme syllabus for studies starting in autumn 2017

This programme has no specialisations.