



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Degree Programme in Engineering Physics 300 credits

Civilingenjörsutbildning i teknisk fysik

Valid for students admitted to the education from autumn 18 (HT - Autumn term; VT - Spring term).

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

Programme objectives

The programme's aim

Engineering physics comprises basic mathematics and physics and technique and their technical applications. The study programme gives a broad knowledge base which can be applied within widely varying fields.

The programme's objectives

For the Master of Science in Engineering Physics degree, the student must fulfill the objectives which are stated in the Higher Education Degree Ordinance for Master of Science degrees.

Knowledge and understanding

A student who has completed the programme should be able to:

- show such knowledge and abilities which are needed in order to independently work as a Master of Science in Engineering
- show knowledge about the chosen specialisation area's scientific foundation and its tested experience and insight into current research and development work
- Show such a broad ability within the chosen technical area including knowledge in mathematics and physics and technique as well as essentially deepened knowledge within certain parts of the area.

In addition, students in Master of Science in Engineering Physics should:

- show broad ability which can be applied even within areas beyond the chosen specialisation
- Be a master of advanced mathematical methods and their applications within the different areas.

Skills and abilities

A student who has completed the programme should be able to:

- show an ability to identify, formulate and handle complex problems creatively, critically and independently, analyze and critically evaluate different technical solutions and participate in research and development work and, with that, contribute to knowledge development.
- show an ability to critically and systematically integrate knowledge and show an ability to model, simulate, predict and assess occurrences, even with limited information
- show an ability to plan and with adequate methods carry out sophisticated assignments within given boundaries
- show an ability to develop and manufacture products, processes and systems with regards to humanity's conditions and needs and society's goals for sustainable development.
- Show an ability to present and discuss one's conclusions, knowledge, and arguments that founded the conclusion clearly in writing and orally in both a national and international settings, and in dialogue with different target groups.

For a Master of Science in Engineering Physics, the students should especially:

- be able to quickly recognise technical and natural scientific information even within an unknown area and apply this to problems/inquiries within certain broad fields
- show an ability for problem solving even within areas beyond the chosen masterprogram
- show an ability to choose and apply advanced mathematical methods within certain broad fields

- Show an ability to plan, choose methods for and carry out investigations through modelling and simulation or through measurement, and assessment of results.

Ability to make judgements and adopt a standpoint

A student who has completed the programme should be able to:

- Show the ability to make judgments with regards to relevant scientific, social, and ethical aspects and show awareness of ethical aspects of research and development work.
- show insight into the technology's possibilities and limitations, its role in society and humanity's responsibility for how it is used, including social, economical and environmental aspects
- show insight about and ability to work as a team and cooperate as a team with different groups
- Show the ability to identify one's needs for further knowledge and continuously develop one's skills and abilities

Extent and content of the programme

The Civil Engineering programme in Engineering Physics consists of 300 credits, which at a normal study pace, corresponds to 5 years of full-time study. The programme's first three years are in the first cycle and can, if the student applies to do so, be concluded with a technology bachelor's degree. The last 2 years are in the second cycle.

The first three years of the programme are mainly in Swedish, with certain English literature included. The last 2 years are mainly taught in English.

Eligibility and selection

General and specific entry requirements:

For eligibility requirements and selection, see the KTH admission policy, www.kth.se

Mathematics and Physics test

Applicants to the civil engineering programme in Vehicle Engineering can take a mathematics and physics test.

This is a way, except for the grades and higher education test, to compete about the available places.

More information about the test:

<http://www.matematik-och-fysikprovet.se/ma-fyprovet-sv/>

Apply for later year of the program:

To be able to apply for a later year of the program, the student must have fulfilled compulsory courses corresponding to 45 credits within the program at KTH. 35 credits shall belong to year 1 of

the applied program.

The program also has specific entry requirements. One requirement is knowledge corresponding to the course Mechanics, Smaller Course 6.0 credits, <http://www.kth.se/student/kurser/kurs/SG1102>.

This course shall be among the 25 credits from year 1. Also the course Mechanics, Addition Course 3.0 credits, <http://www.kth.se/student/kurser/kurs/SG1301>

Implementation of the education

Structure of the education

The study years for KTH's undergraduate programme is divided into four periods. For more information: www.kth.se

The study programme is organized around courses in the mathematical, technical scientific and technical application subjects. The lectures in, and the use, of complementing personal and professional abilities meaningful for a Master of Science in Engineering, for example, communication, ethics, company and society aspects, are integrated into the courses.

To make the study programme complete, collaboration between different subjects within every study year as well as between the study years themselves, is emphasized. This means that the courses are being coordinated through common schedules, project work and hand-in assignments.

The study programme's plan consists partly of the compulsory courses in study (years 1-3) and partly of a specialisation from study (years 4-5) which ends with a degree project, second cycle, of 30 credits.

The lectures in study years 1-2, and portions of study year 3, are the same for everyone studying in the programme. Before the end of the bachelor studies, the student chooses a master's program within the frame of the program.

The master's program which leads to a Civil Engineering in Vehicle engineering are listed below <https://www.kth.se/student/program/masterprogram>

Courses

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

The programme is composed with compulsory and elective courses. The compulsory courses are defined for every course in the teaching and time schedules. The different courses' goals, prerequisites, contents and course examination specifications, can be found in the course plans.

Technique Complementary courses

The main part of the program should be within the technical field Engineering physics.

In addition to the degree Civil Engineering in Engineering Physics there is an opportunity for a maximum of 25 credits technology complementary courses, as courses in language, economics, management and philosophy. This applies if the other requirements of the levels and depth for the degree are met. Technique complementary courses can either be read at KTH or at another university and be counted (see section on accreditation). However, the following restrictions:

- Technical complementary courses may not overlap existing program courses
- Preparatory courses for higher education may not count as technical complementary courses
- Courses within the subject on a lower level than the existing program courses may not be counted as technical complementary courses.
- The application to receive credits for course within the framework of technology complementary courses in Master of Science degree in Engineering Physics student should justify how the course fits into the student's profile on the program. The application is assessed and approved by the program director.

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.

Since the grading systems differ very much between different countries, the grades are not translated from exchange studies abroad.

Degree project, first and second cycle, have grading scale pass (P) and fail (F).

Conditions for participation in the programme

Participation requires admission to courses within the programme and course registration. Course registration is done via the personal menu at www.kth.se

Course Selection

Application to courses

The application of courses

- May 1-15 for the Autumn semester
- November 1- 15 for the Spring semester

at KTH's application for courses within study programme kth.se-account by www.antagning.se

Conditions for further studies

For students starting their education from the autumn semester 2018, previous promotion requirements have been replaced with special admission requirements to each course. Admission requirements are specified in the course syllabus.

For studies at advanced level, master level:

- At least 165 credits from years 1-3 must be completed (60 credits from year 1 and 50 credits from year 2)
- The course degree project, 15 must be completed
- In addition special requirements for different master's program

Applying to the advanced level within the Civilengineering programme:

Application is done in the spring semester of study year 3, May 1 - 15. There is also a possibility to apply to a general master with an individual package of courses. Contact the student education office, the student counseling, for more information. <https://www.kth.se/student/program/masterprogram>

Master's programmes leading to a degree in Civil engineering but with different application procedure

The following programs leading to a degree in Civil engineering but have different application procedure. The programs have limited places, different prerequisites and different application dates. More information on KTH's web

- Computer Simulation for Science and Engineering
- Energy Innovation: only track Nuclear Energy (NUEY)
- Dual Master in Aerospace Engineering (KTH/Bologna)
- Railway Engineering

Application for Individual Course Package

Within the program in Civil Engineering there is a possibility to combine courses at advanced level to an individual course package. Please notice the different options within the different master's program.

Forms are available here:

https://www.kth.se/social/files/5767b1bef276540f7635cef1/ans%C3%B6kan_generell_master%20131002.pdf

In the application, the student must formulate the idea of the individual course package and define the courses to be included. For the degree project, a preliminary approval must be obtained from the examiner at the appropriate institution. At least 30 credits at advanced level must be within the same main field of study as the thesis. It is the student's responsibility to check whether the courses are given each year or if there are other reservations when a course will be given. It is good to know that an individual course package implies a certain amount of inevitable schedule collision.

The application will be submitted to the program office at the School of Engineering Sciences during the same period as the master's thesis will be made (1-15 May). Decisions of the application will be approved by the programme director

Recognition of previous academic studies

The recognition of previous academic studies is an important element to facilitate the mobility within the country and between countries, for the higher education's internationalization work and for life-long learning.

KTH will have an open manner of recognition of previous academic studies. Recognition will, therefore, be a possibility if the exact programme does not exist at KTH, or the contents in, for example, course plans do not exactly correspond to KTH's. The requirements which KTH normally sets on the study programme's level and quality will be taken into consideration when recognizing previous academic studies.

A student at KTH studying at another university within an exchange agreement has the right to receive an advanced notification about recognition of previous studies. Such a notification can, for example, be given through a study plan which must be established and signed by the program director at KTH.

The student at KTH has the right to receive a trial recognition of previous academic studies. Even a student who is not a student at KTH, but has academic education and aims to complete it, must, submit the application and get a preliminary decision (advanced notification) about the recognition of previous academic studies.

Even degree project work can be exceptionally be recognized.

Decision about recognition of courses can be appealed through the Board of Appeals for higher education. The appeal must be submitted to KTH at the latest within three weeks from the day the applicant was notified of the decision.

In order to apply for recognition of previous academic studies, the applicant must normally be able to document that he/she has graduated in courses (corresponding) with at least passing results. The study performance is graded by the university where the exam was taken.

For more information visit www.kth.se

Studies abroad

Students in the Vehicle Engineering programme have the unique possibility to study as exchange students at first-class university all over the world. Exchange studies means that the student take courses at another university where KTH has an agreement.

Applying for exchange studies is done ones a year. There is a possibility to choose to study one semester, one year, or two years (double degree) abroad.

For more information please contact the international coordinators for more information: exchange-out@sci.kth.se.

More information about exchange studies could be found here:
<http://www.kth.se/student/utlandsstudier>

Degree project

Degree project, First cycle, 15 credits (bachelor)

In the spring semester of year 3 the student must complete a first degree degree project in vehicle engineering amounting to 15 credit. The project work may begin when special admission requirements for the course are fulfilled.

Degree project, Second cycle, 30 credits (master)

A degree project work which corresponds to 30 credits corresponding to one semester full-time studies is also included in the study programme. The degree project is the final part of the education. The project work may begin when special admission requirements for the course are fulfilled.

- The degree project work is normally carried out within a subject central to the programme's technical area.
- The degree project work may not begin before the assignment is approved by the examiner of the chosen department and is submitted to the programme office
- The examiner is responsible for the student to have sufficient prerequisites for the chosen assignment.
- The degree project work is based on the knowledge which is acquired during the entire study time and will normally be done during the tenth semester within the chosen specialisation. If the student desires to do degree project work within another specialization area, it must be approved by the programme director
- The degree project work should show that the student is capable to independently apply his/her acquired knowledge during the study time and therefore is done at the end of the programme; therefore, the start of the degree project is, at the earliest, during semester 9 within the chosen specialisation.
- The degree project work must provide proof of an independent, engineering-related work consisting of theoretical and/or experimental activity with a corresponding report.
- The degree project work can include other elements, for example, seminars, information searching, student teaching, opposition or other elements which the examiner or supervisor deems suitable.
- The degree project work is carried out individually or together with another student. In the later case, the examiner will ensure that every student's workload corresponds to the requirements for an individual degree project work.
- The supervisor is appointed by the examiner

More information www.kth.se

The application form for degree project <https://www.kth.se/social/files/5767b17df27654101d0b5982/examensarbetsansokan.pdf>

is submitted signed by the student, the school administration and the examiner.

Degree

The Master of Science in Engineering degree is received after the completion of the study programme. The student must fulfill the national and local degree requirements and has completed courses corresponding to 300 credits subject to the following.

- The mathematical-natural scientific subjects of at least 45 credits, and moreover, at least 180 credits (including 30 credits of degree project, second cycle, work) in the subject central to the technical area.
- At least 90 credits in the second cycle, where at least 60 credits (including 30 credits of degree project work) in the subjects central to the technical area.

The student must have complementing technical knowledge in accordance with the national degree ordinance and the study programme's local objectives.

The name of the degree is: "Degree of Master of Science in Engineering Physics".

Degree Application

The student has the possibility to apply for three different degrees, degree of Bachelor in Technology, Degree of Master of Science in Engineering, and Master's Degree in Engineering. The application for the degree is found at the personal meny at www.kth.se – log in with the KTH-id.

KTH Regulations at the website: www.kth.se

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Degree Programme in Engineering Physics (CTFYs)

General courses

Year 1

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
DD1331	Fundamentals of Programming	5.0 hp	First cycle
SF1672	Linear Algebra	7.5 hp	First cycle
SF1673	Analysis in one variable	7.5 hp	First cycle
SF1674	Multivariable Calculus	7.5 hp	First cycle
SF1922	Probability Theory and Statistics	6.0 hp	First cycle
SG1112	Mechanics I	9.0 hp	First cycle
SI1121	Thermodynamics	6.0 hp	First cycle
SI1146	Vector Analysis	4.0 hp	First cycle
SK1104	Classical Physics	7.5 hp	First cycle

Optional courses

Code	Name	Credits	Edu. level
DD1301	Computer Introduction	1.5 hp	First cycle

Year 2

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
DD1327	Fundamentals of Computer Science	6.0 hp	First cycle
SE1055	Strength of Materials and Solid Mechanics, Basic Course with Energy Methods	9.0 hp	First cycle
SF1544	Numerical Methods, Basic Course IV	6.0 hp	First cycle
SF1681	Linear Algebra. Advanced Course	6.0 hp	First cycle
SF1683	Differential Equations and Transforms	9.0 hp	First cycle
SG1113	Mechanics, Continuation Course	6.0 hp	First cycle
SH1014	Modern Physics	4.0 hp	First cycle
SI1155	Theoretical Physics	6.0 hp	First cycle
SI1200	Mathematical Methods in Physics	4.0 hp	First cycle
SK1105	Experimental Physics	4.0 hp	First cycle

Year 3

Mandatory courses (30.0 Credits)

Code	Name	Credits	Edu. level
EI1320	Electromagnetic Theory	9.0 hp	First cycle
EL1000	Automatic Control, General Course	6.0 hp	First cycle
SG1218	Fluid Mechanics	4.0 hp	First cycle
SH1015	Applied Modern Physics	5.0 hp	First cycle
SI1336	Simulation and Modeling	6.0 hp	First cycle

Optional courses

Code	Name	Credits	Edu. level
AK2011	Technology and Ethics	7.5 hp	Second cycle
AK2014	Decision Theory	7.5 hp	Second cycle
DD1380	Java Programming for Python Programmers	1.5 hp	First cycle
DD1389	Internet Programming	6.0 hp	First cycle
DD2352	Algorithms and Complexity	7.5 hp	Second cycle
DD2380	Artificial Intelligence	6.0 hp	Second cycle
DD2421	Machine Learning	7.5 hp	Second cycle
SF1677	Foundations of Analysis	7.5 hp	First cycle
SF1678	Groups and Rings	7.5 hp	First cycle
SF1679	Discrete Mathematics	7.5 hp	First cycle
SF1691	Complex Analysis	7.5 hp	First cycle
SF1811	Optimization	6.0 hp	First cycle
SF1904	Markov Processes, Basic Course	3.0 hp	First cycle
SF2520	Applied Numerical Methods	7.5 hp	Second cycle
SF2521	Numerical Solutions of Differential Equations	7.5 hp	Second cycle
SF2701	Financial Mathematics, Basic Course	7.5 hp	Second cycle
SF2930	Regression Analysis	7.5 hp	Second cycle
SF2940	Probability Theory	7.5 hp	Second cycle
SH2402	Astrophysics	6.0 hp	Second cycle
SII142	Mathematical Methods in Physics, Additional Course	3.0 hp	First cycle
SII162	Statistical Physics	7.5 hp	First cycle
SI2360	Analytical Mechanics and Classical Field Theory	7.5 hp	Second cycle
SI2371	Special Relativity	6.0 hp	Second cycle
SI2720	Biophysics	7.5 hp	Second cycle
SK1160	Environmental Physics	9.0 hp	First cycle
SK2758	Solid State Physics	7.5 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
EF112X	Degree Project in Electrical Engineering, First Cycle	15.0 hp	First cycle
SA114X	Degree Project in Engineering Physics, First cycle	15.0 hp	First cycle

Year 4

Supplementary information

The last two years of the program are completed within the context of a master's program.

Courses taken within the fourth year will refer back to the first year's annual study plan in the master's program that you have chosen.

The selectable master's programs leading to a Master of Science in Engineering Physics are:

Engineering Physics

Mathematics

Applied and Computational Mathematics

Engineering Mechanics

Nuclear Energy Engineering

Computer Science

Electromagnetics, Fusion and Space Engineering

Aerospace Engineering

Vehicle Engineering

Nano Technology

Naval Architecture (not track Management)

Machine Learning

Systems, Control and Robotics

Year 5

Supplementary information

The last two years of the program are completed within the context of a master's program.

Courses taken within the fifth year will refer back to the second year's annual study plan in the master's program that you have chosen.

The selectable master's programs leading to a Master of Science are:

Engineering Physics

Mathematics

Applied and Computational Mathematics

Engineering Mechanics

Nuclear Energy Engineering

Computer Science

Electrophysics

Aerospace Engineering

Vehicle Engineering

Nano Technology

Naval Architecture (not track Management)

Machine Learning

Systems, Control and Robotics

Information and Network Engineering



Appendix 2: Specialisations

Degree Programme in Engineering Physics (CTFYS)

This programme has no specialisations.