



Programme syllabus

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

Degree Programme in Vehicle Engineering 300 credits

Civilingenjörsutbildning i farkostteknik

Valid for students admitted to the education from autumn 11 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Vehicle engineering is concerned with air and water vehicles, ground and rail automobiles and systems where these are components. The Master of Science in Engineering programme in Vehicle Engineering aims to provide the students with knowledge, abilities, and attitudes which are demanded in order to be able to participate in the development of vehicles and systems – from idea formulation, construction, and implementation, to operation and maintenance. The programme also prepares the student for work within other parts of society where knowledge within applied mechanics or system technology is useful, as well as for research programmes.

The Vehicle Engineering programme's vision is to provide a Master of Science in Engineering program which emphasizes fundamental knowledge in the context of Conceiving – Designing – Implementing – Operating complex technical systems and new products.

The Vehicle Engineering programme's fundamental idea is to provide an education which:

- integrates abilities in disciplinary mathematics, natural science, technical science and technology with general engineering abilities
- consists of a number of projects which include the elements of design, manufacturing and testing
- is supported by active and experience-based learning methods
- actively supports the teachers' development of their engineering experience.
- takes place in common lecture halls, as well as, labs and workshops
- is developed through the constant improvement philosophy

Knowledge and understanding

A Master of Science in Engineering in the Vehicle Engineering programme should:

- have the ability to independently apply math and basic natural science within his/her own technical area
- be able to masterfully and independently apply basic principles within a broad technically scientific area
- within his/her own technical area, be able to practice a creative and critical work ethic in order to formulate and research problems with modern methods and tools, within a certain areas.
- be able to analyze technical problems from a system perspective with an overview of technical systems and their life cycles, from idea/need to specification, development, manufacturing, operation and termination

Skills and abilities

A Master of Science in Engineering in the Vehicle Engineering programme should:

- have understanding that engineering-related problems are often complex, can be incompletely defined, and sometimes contain conflicting conditions
- show insight in that problem solutions start with need and function, with regards to business related conditions, the technology's influence on the environment and technology's role in society.
- show ability in an engineering-related context to be able to communicate, orally and in writing with different target groups in Swedish and English and to be able to discuss the conclusions and the knowledge and arguments which provide the foundation for these conclusions.
- through practice and reflection, develop the ability to work effectively in a group
- be able to identify conflicts between different ethical points-of-view within the profession
- be able to follow and use the scientific developments within the technical area and have the awareness of the main features in current development and research within the technical area

Ability to make judgements and adopt a standpoint

A Master of Science in Engineering in the Vehicle Engineering programme should:

- understand and respect the meaning of how technology affects humans and society with regards taken to the limited supply of energy and materials
- be able to show insight for the possibilities and limitations of technology, its roll in society and humans responsibility for how it is used

The above ensures that the Master of Science in Engineering programme agrees with societies demands, which are expressed in the Higher Education Act and the Higher Education Ordinance.

General description of the masterprogrammes

The following general programme objectives apply to the specialisations: The student will:

- be able to use and design tools or models for analysis and testing from the foundations which are acquired through studying natural scientific and technical subjects
- in an engineering-related manner, train problem solving with the opportunity to use creative methods
- practice placing oneself in new subject areas and obtaining information about technology and methods
- have awareness about the main features in the current development and research within the chosen specialisation area.
- Practice planning, leading and participating in development work. This includes identifying, analyzing, and specifying a product, a system or a process which will answer a specific need. It also consists of economic planning, follow-up and appraisal and using computer-based utilities
- Develop one's own ability to communicate and work on a team. Be able to present results in a clear and correct manner both orally and in writing, in Swedish as well as English
- Understand and have respect for the meaning of how technology affects people and society with regards to the limited supply of energy and materials

All information about the degree requirements for the Master of Science in Engineering degree, student Bachelor's Degree, and respective masters degrees can be found in KTHs local degree ordinance.

<http://intra.kth.se/regelverk/utbildning-forskning>

Extent and content of the programme

The Master of Science in Engineering programme in Vehicle Engineering consists of 300 credits, which at normal study speed corresponds to five years of full time study. The programme's first

three years are in the first cycle and can be concluded with a technology Bachelor's Degree, if the student applies to do so. The last two years are concluded in the second cycle.

The programme provides a stable technical foundation as well as knowledge and abilities to further the development of all possible vehicles. Mathematics, mechanics, and solid mechanics are studied during the first three years. Years 4-5 focus on the specialisation areas. The programme gives students the ability to optimize the following factors: stability, solidity, security, environmentally friendly and comfort. This demands a combination of creative thinking and advanced calculation.

The first three years in the programme are mainly in Swedish; although, some English literature and occasional elements where English is used are present. The final two years of courses are mainly in English.

Eligibility and selection

See KTHs admission policy at <http://intra.kth.se/regelverk/utbildning-forskning>

<http://www.kth.se/utbildning/anmalan-antagning/matematik-och-fysikprovet-1.76686>

Implementation of the education

Structure of the education

The study years for KTH's undergraduate programme is divided into four periods. Every study period is followed by an exam period including two free days and at least five exam days. Beyond those four ordinary exam periods, three re-exam periods are given: after Christmas, after the study years last ordinary exam period, and directly before the study year's first study period.

The study year consists of 40 weeks. If necessary, lectures can take place outside of the study year.

The study programme is organized around courses in the mathematical, technical scientific and technical application subjects. The lectures in and usage 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.

In order 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 happens by the courses being coordinated through common schedules, project work and hand-in assignments.

The study programme is designed in such a manner that the student studying after three years will have the possibility to take a degree of Bachelor in order to, if desired, continue his/her studies in another program at KTH or another University in Sweden, or abroad.

The study programme's plan consists partly of the mandatory courses in study years 1-3, and partly of a specialisation from study year 4-5 which concludes with a degree project 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 concluding portion of the study programme, the student chooses a masterprogramme.

In and after study year 3, the student can choose optional or conditionally optional courses. In study year 3, there are 9 credits available for this. In study year 4-5, the number of optional course credits varies depending on which specialisation the student chooses, but the study programme will include at least 20 optional credits.

Courses

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

In the study programme, there are obligatory, conditionally eligible and optional courses. The obligatory courses are defined in the teaching and time schedule for every study year and specialisation. The different courses' objectives, prerequisites, content and examination specifications are found in the respective course plans.

The space for optional courses within the Vehicle Engineering programme is first allocated in study year 3. Only with exception can optional courses be allowed before study year 3.

Optional courses can be chosen from KTHs course options for Master of Science in Engineering's programmes. Even courses from other universities can be approved.

For optional courses, the following restrictions apply:

- Optional courses can not be taken in study year 1
- Only with exception can optional courses be taken in study year 2
- The number of credits which can be chosen per semester can be limited.
- Optional courses cannot overlap study programme-specific courses to a meaningful extent.
- Higher education preparation courses may not be counted as optional courses
- Courses on lower levels within a subject than available study programme courses may not count as optional courses.

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.

Conditions for participation in the programme

Term enrolment

Every study year, enrolment notification for the next term must be completed with forms on KTH's website at the latest November 15th and May 15th respectively. The notification makes the grade registration possible as well as the payment from CSN.

Study recess

Study recess means that the student does not participate in lectures during at least one study period. Approved study recess gives the student the right to return to the studies at a given time. During the study recess the student may complete and participate in examination in previously enrolled courses.

The application concerning a study recess is submitted to the programme office, which approves or rejects the application. When the student decides to resume the studies, a new application must be submitted.

Course Selection

Application to optional courses and course registration.

The student is obligated to apply to the optional courses he/she wishes to attend the following semester. Decisions about place assignment of courses are made by the programme office. Regards are taken to the economical and physical space limitations. The application of optional courses must be handed-in to the SCI office at the latest:

- May 15th for the fall term
- November 15th for the spring term

Applications which are submitted after the last application deadline are taken into consideration space is available. Before course selection for language courses is done, a test will be done for level-placement.

Course enrolment notification to obligatory courses happens, in most cases, automatically by the office. Separate notification is demanded for those who study individual specialisations and for those who choose among alternative obligatory courses or corresponding.

The student will, upon the first scheduled lecture, register the course. Course registration for both obligatory courses and optional courses must be done individually at the department. The student who registers in a course and then decides to not proceed must notify the corresponding department.

Conditions for being promoted to the next level

For studies in study year 2:

At least 45 credits from study year 1 must be completed by August in study year 2.

For studies in study year 3:

At least 90 credits from years 1-2 must be completed by August in study year 3 (of which at least 50 credits from year 1).

For studies in study year 4:

At least 150 credits from years 1-3 must be completed by August of year 4 (of which at least 110 credits from years 1-2). Included in these 150 credits, 15 credits must be from degree project in vehicle engineering, first level and credits from possible prerequisite courses must be completed as well.

In addition, all courses which constitute prerequisites to courses during the coming year must be completed by August of year 4.

Students who do not fulfill the requirements for continuing enrolment for the next year must contact the programme's study counseling in order to establish an individual study plan.

Selection of masterprogramme

Preliminary choice is done in the fall term of study year 3, November 1 - 15.

Course registration

Registration of courses must be done using course selection in Ladok. The course selection is done either through the course selection routine on the web or through the student's study programme office. Registration of courses is done by the course's responsible department. If the student discontinues the course, the student must notify the department of this.

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 able to happen even 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.

Recognition of previous academic studies which are decided with another higher education institution in Sweden must normally be accepted by KTH.

A student at KTH who carries out studies at another university within the boundaries of an exchange agreement has the right to receive advanced notification about recognition of previous studies. Such a notification can, for example, be given through a Learning Agreement which must be established and signed by the coordinator at KTH, contact person at the university abroad and the student.

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

Even degree project work can be recognized. KTH considers it, nevertheless, appropriate that the degree project work is performed at KTH (within a school or at a company with supervisor from KTH).

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 for a trial 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, not by the recognition of KTH.

<http://intra.kth.se/regelverk/utbildning-forskning>

Studies abroad

The 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 substitutes a portion of his/her study time at KTH with studies at a university abroad with which KTH has an agreement.

There is a possibility to choose to study one semester, one year, or two years (double degree) abroad. Double degree means that the student receives an exam both from KTH and from the university abroad. Companies like Daimler Chrysler and Airbus actively recruit those who have double degrees and to speak the language of the country is an assumption in order for the student to be able to be employed abroad.

Degree project

First level (bachelor)

In the spring semester of year 3 the student must complete a first level degree project in vehicle engineering amounting to 15 hp, corresponding to about 5 months of half-time studies. The student

must have fulfilled at least 120 hp from the programme's first three years to be qualified. A general exemption is made if the student have fulfilled at least 108 hp before starting the degree project. NB! The results from the re-exam-period in January is excluded.

Second level (master)

A degree project work which corresponds to 30 credits corresponding to about 5 months full-time studies is also included in the study programme.

- 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 institution and is submitted to the programme office using special forms.
- The main portion of the studies, at least 230 credits, must be completed, and the student may not have more than two unfinished courses of the mandatory courses in study years 1-3.
- 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 office.
- 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, it is normally started, 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 latter 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

Link to the grading scale of the degree project work: <http://intra.kth.se/regelverk/utbildning-forskning>

The application form for degree project work (<http://www.kth.se/dokument/student/sci/blankett/examensarbetsanmalan.pdf>) is submitted signed by the student and examiner to the programme office.

The degree project work has more detailed rules and guidelines from each respective department.

Degree

The Master of Science in Engineering degree is received after the completion of the study programme. The programme must be designed so that the student with the degree fulfills 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 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 study programme will be designed so that the student with the degree has complementing technical knowledge in accordance with the national degree ordinance and the study programme's local objectives.

The name of the degree is Master of Science in Engineering

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. The application for the degree is done with special forms (<http://www.kth.se/dokument/student/sci/blankett/examensarbetesanmalan.pdf>) and is put to the office of School of Engineering Science's programme office. With the application, proof of the paid student union fee must be attached.

<http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina/1.27227>

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Degree Programme in Vehicle Engineering (CFATE)

General courses

Year 1

Mandatory courses (60.5 Credits)

| Code | Name | Credits | Edu. level |
|------------------------|---|---------|-------------|
| DN1212 | Numerical Methods and Basic Programming | 9.0 hp | First cycle |
| SD1000 | Perspectives on Vehicle Engineering | 9.0 hp | First cycle |
| SF1624 | Algebra and Geometry | 7.5 hp | First cycle |
| SF1625 | Calculus in One Variable | 7.5 hp | First cycle |
| SF1626 | Calculus in Several Variables | 7.5 hp | First cycle |
| SG1131 | Mechanics I | 11.0 hp | First cycle |
| SK1112 | Physics I | 9.0 hp | First cycle |

Optional courses

| Code | Name | Credits | Edu. level |
|------------------------|--------------------------------------|---------|-------------|
| SF1611 | Introductory Course in Mathematics I | 1.5 hp | First cycle |

Year 2

Mandatory courses (60.0 Credits)

| Code | Name | Credits | Edu. level |
|------------------------|--|---------|-------------|
| MF1015 | Product Realization | 12.0 hp | First cycle |
| SD1120 | Noise and Vibration Control | 9.0 hp | First cycle |
| SE1010 | Solid Mechanics, Basic Course with Project | 12.0 hp | First cycle |
| SF1634 | Differential Equations II | 9.0 hp | First cycle |
| SG1140 | Mechanics II | 6.0 hp | First cycle |
| SG1216 | Thermodynamics | 6.0 hp | First cycle |
| SG1217 | Fluid Mechanics, Basic Course | 6.0 hp | First cycle |

Year 3

Mandatory courses (36.0 Credits)

| Code | Name | Credits | Edu. level |
|------------------------|-----------------------------------|---------|--------------|
| EL1000 | Automatic Control, General Course | 6.0 hp | First cycle |
| MF1017 | Basic Electrical Engineering | 6.0 hp | First cycle |
| SD2125 | Signals and Mechanical Systems | 6.0 hp | Second cycle |
| SE1025 | FEM for Engineering Applications | 6.0 hp | First cycle |
| SF1861 | Optimization | 6.0 hp | First cycle |
| SF1901 | Probability Theory and Statistics | 6.0 hp | First cycle |

Conditionally elective courses

| Code | Name | Credits | Edu. level |
|------------------------|---|---------|-------------|
| MF104X | Degree Project in Design and Vehicle Engineering, First Cycle | 15.0 hp | First cycle |
| MF109X | Degree Project in Design and Vehicle Engineering, First Cycle | 15.0 hp | First cycle |
| MF114X | Degree Project in Design and Vehicle Engineering, First Cycle | 15.0 hp | First cycle |
| MJ142X | Degree Project in Vehicle Engineering, First Cycle | 15.0 hp | First cycle |
| SA105X | Degree Project in Vehicle Engineering, First Cycle | 15.0 hp | First cycle |

Supplementary information

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

For information about curriculum in year 4-5 see masterprogrammes in:

Aerospace Engineering, Vehicle Engineering, Sustainable Energy Engineering, Industrial Management, Engineering Design, Integrated Product Design - track Concurrent Engineering, Nuclear Energy Engineering, Naval Architecture, Engineering Mechanics, Applied and Computational Mathematics.

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 Vehicle Engineering are:

- Aerospace Engineering
- Vehicle Engineering
- Sustainable Energy Engineering
- Industrial Management
- Engineering Design
- Integrated Product Design - track Concurrent Engineering

- Nuclear Energy Engineering
- Naval Architecture
- Engineering Mechanics
- Applied and Computational Mathematics.

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 in Vehicle Engineering are:

- Aerospace Engineering
- Vehicle Engineering
- Sustainable Energy Engineering
- Industrial Management
- Engineering Design
- Integrated Product Design - track Concurrent Engineering
- Nuclear Energy Engineering
- Naval Architecture
- Engineering Mechanics
- Applied and Computational Mathematics.



Appendix 2: Specialisations

Degree Programme in Vehicle Engineering (CFATE)

This programme has no specialisations.