



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 17 (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

Outcomes

For a Degree of Master of Science in Engineering the student shall demonstrate the knowledge and skills required to work autonomously as a graduate engineer.

Knowledge and understanding

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

- demonstrate knowledge of the disciplinary foundation of and proven experience in his or her chosen field of technology as well as insight into current research and development work, and
- demonstrate both broad knowledge of his or her chosen field of technology, including knowledge of mathematics and the natural sciences, as well as a considerable degree of specialised knowledge in certain areas of the field.

Skills and abilities

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

- demonstrate the ability to identify, formulate and deal with complex issues autonomously and critically and with a holistic approach and also to participate in research and development work and so contribute to the formation of knowledge
- demonstrate the ability to create, analyse and critically evaluate various technological solutions
- demonstrate the ability to plan and use appropriate methods to undertake advanced tasks within predetermined parameters
- demonstrate the ability to integrate knowledge critically and systematically as well as the ability to model, simulate, predict and evaluate sequences of events even with limited information
- demonstrate the ability to develop and design products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community
- demonstrate the capacity for teamwork and collaboration with various constellations, and

- demonstrate the ability to clearly present his or her conclusions and the knowledge and arguments on which they are based in speech and writing to different audiences in both national and international contexts.

Ability to make judgements and adopt a standpoint

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

- demonstrate the ability to make assessments informed by relevant disciplinary, social and ethical aspects as well as awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of technology, its role in society and the responsibility of the individual for how it is used, including both social and economic aspects and also environmental and occupational health and safety considerations, and
- demonstrate the ability to identify the personal need for further knowledge and undertake ongoing development of his or her skills.

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.

Independent project (degree project)

A requirement for the award of a Degree of Master of Science in Engineering is completion by the student of an independent project (degree project) for at least 30 credits.

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 at KTH Regulations at the website www.kth.se.

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

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.

Study year 1, 2 and 3 – First cycle

Mandatory courses Study year 1

Vehicle Engineering – a first year introductory engineering course

Mathematical (one and multi variable calculus) and Numerical Analysis and Applied Linear Algebra

Physics I

Mechanics I with project

Mandatory courses Study year 2

Mechanics II

Solid Mechanics, Basic course with Project

Product Development

Fluid Mechanics, Basic course

Differential Equations and numerical analysis

Noise and Vibration Control

Thermodynamics

Mandatory courses Study year 3

Basic Electrical Engineering

Probability Theory and Statistics

Automatic Control, General course

Signals and Mechanical Systems

FEM for Engineering Applications

Optimization

Conditionally Elective Course, Study year 3 – a chosen Degree Project in Vehicle and Mechanical Engineering: Degree Project, First cycle, 15 credits.

Study year 4 and 5 – Second cycle

The last two years of the program – study year 4 and 5 - are completed within the context of a master's program.

Master's programmes leading to a five-year MSc degree in Vehicle Engineering:

- Aerospace Engineering
- Vehicle Engineering
- Sustainable Energy Engineering
- Industrial Management
- Engineering Design
- Integrated Product Design - track Innovation Management and Product Development
- Nuclear Energy Engineering

- Naval Architecture
- Systems, Control and Robotics
- Engineering Mechanics
- Applied and Computational Mathematics.

For information about curriculum in year 4-5 see master's programmes above.

For master's programmes leading to a five-year MSc degree in Vehicle Engineering there are no space limitations. An exception to this rule applies for the master's programmes in collaboration with other universities. These programmes may have space limitations and other eligibility requirements, and must be applied to during the application period specified by each programme.

The School of Engineering Sciences has decided that a master's programme, offered in cooperation with other universities, can lead a five-year MSc degree if the following conditions are fulfilled:

- At least 30 ECTS of the master programme's courses must be completed at KTH (in addition to the degree project)
- The degree project (30 ECTS) must meet the objectives of the five-year MSc degree.

Master's programmes with space limitations and other eligibility requirements:

Computer Simulation for Science and Engineering

Maritime Engineering

Energy Innovation: only track Nuclear Energy (NUEY)

Dual Master in Aerospace Engineering (KTH/Bologna)

Railway Engineering, starts Autumn semester 2017 (HT17)

Eligibility and selection

In order to be eligible, you must fulfill the general admission requirements for higher education as well as the specific admission requirements for the programme.

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

<https://www.kth.se/utbildning/civilingenjor/farkostteknik>

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

KTH Admissions Office: admissions@kth.se

Eligibility to Master's programmes leading to a five-year MSc degree in Vehicle Engineering – see above.

Implementation of the education

Structure of the education

The study years for KTH's undergraduate programme is divided into four periods. The study year consists of 40 weeks. If necessary, lectures can take place outside of the study year.

Every study period is followed by an exam period. An exam registration is compulsory for all exams at least 14 days in advance. Re-exams are given in periods January, March, June and August. This means that for each course there will be only one re-exam opportunity each 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, 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 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 8-9 credits available for this. In study year 4-5/the master programmes, the number of optional course credits varies.

Courses

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

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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.

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Degree project, first and second cycle, have grading scale pass (P) and fail (F) from July 1 2015. 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 – Semester registration

Everyone admitted to an educational programme at KTH must register for the semesters they intend to study. Semester registration is a prerequisite and is required for the registration and reporting of results on courses. You can carry out a web registration at the same time as the semester starts, provided that you have fulfilled requirements for the coming semester. Registration is necessary so that the results can be reported and is a prerequisite in order to obtain student aid which is paid out by CSN.

Semester registration – Web registration: Log on with your KTH-id – “Personal menu” – from semester 2. If you are recently admitted as a programme student you cannot web register your programme: semester registration first semester is made by the Student Education Office after the programme registration. For more information contact your Student Education Office, the student counselor.

Course Selection

Application to optional courses

The application of optional courses www.antagning.se / www.universityadmissions.se:

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

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 mandatory courses happens, in most cases, automatically by the student education office. Separate notification is demanded for those who study individual specialisations and for those who choose among alternative mandatory courses or corresponding.

The student who registers in a course and then decides to not proceed must notify the corresponding department.

Course registration

At the department giving the course. Or on the website – Log on with your KTH-id – at your “Personal menu”.

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). Before starting to work with the Degree project, First cycle, 15 credits, at least

120 credits, whereof at least 105 credits from study year 1, 2 and 3, must be completed before December 20th.

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 cycle, 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.

For studies in study year 5:

At least 45 credits from study year 4 must be completed by August in study year 5.

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.

Applying to a masterprogramme

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 counsellor, for more information.

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 cycle, and credits from possible prerequisite courses must be completed as well.

Course registration

At the department giving the course. Or on the website – Log on with your KTH-id – at your "Personal menu". 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 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

Degree project (independent 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 credits, corresponding to one semester of half-time studies. Before starting to work with the Degree project, First cycle, 15 credits, at least 120 credits, whereof at least 105 credits from study year 1, 2 and 3, must be completed before December 20th.

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 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 240 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

Grading scale of the degree project work: Degree project, first and second cycle, have grading scale pass (P) and fail (F) from July 1 2015. (Students accepted for studies at KTH July 1, 2007 – June 30, 2015 may chose grading scale A-E for Degree project.)

The application form for degree project (<http://www.kth.se/dokument/student/sci/blankett/examensarbetesanmalan.pdf>) is submitted signed by the student, the school administration and the examiner.

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, 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 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: "Degree of 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 found at the personal menu 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 Vehicle Engineering (CFATE)

General courses

Year 1

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
SD1001	Vehicle Engineering	9.0 hp	First cycle
SF1626	Calculus in Several Variables	7.5 hp	First cycle
SF1668	Mathematical and Numerical Analysis I	10.0 hp	First cycle
SF1675	Applied Linear Algebra	13.5 hp	First cycle
SG1132	Mechanics I Inclusive Project	11.0 hp	First cycle
SK1112	Physics I	9.0 hp	First cycle

Year 2

Mandatory courses (61.0 Credits)

Code	Name	Credits	Edu. level
MF1024	Product Development	11.0 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
SF1682	Analytical and Numerical Methods for Differential Equations	11.0 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
EL1010	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
SF1914	Probability Theory and Statistics	6.0 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
EF112X	Degree Project in Electrical Engineering, First Cycle	15.0 hp	First cycle
MF130X	Degree Project in Machine Design, First Cycle	15.0 hp	First cycle
MF131X	Degree Project in Integrated Product Development, First Cycle	15.0 hp	First cycle
MF133X	Degree Project in Mechatronics, First Cycle	15.0 hp	First cycle
MJ146X	Degree Project in Sustainable Energy Engineering, First Cycle	15.0 hp	First cycle
SA115X	Degree Project in Vehicle Engineering, First Level	15.0 hp	First cycle

Supplementary information

Conditionally Elective Course: Degree Project, First cycle, 15 university credits, Spring semester year 3.

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 - preliminar:

Aerospace Engineering, Vehicle Engineering, Sustainable Energy Engineering, Industrial Management, Engineering Design, Integrated Product Design - Track : Innovation Management and Product Development, 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 (preliminar):

- Aerospace Engineering
- Vehicle Engineering
- Sustainable Energy Engineering

- Industrial Management
- Engineering Design
- Integrated Product Design -New Track Autumn 2016 - Track: Innovation Management and Product Development,
- Nuclear Energy Engineering
- Naval Architecture
- Engineering Mechanics
- Applied and Computational Mathematics
- 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 in Vehicle Engineering are (preliminar):

- Aerospace Engineering
- Vehicle Engineering
- Sustainable Energy Engineering
- Industrial Management
- Engineering Design
- Integrated Product Design - New Track Autumn 2016 - Track: Innovation Management and Product Development,
- Nuclear Energy Engineering
- Naval Architecture
- Engineering Mechanics
- Applied and Computational Mathematics.
- Systems, Control and Robotics



Appendix 2: Specialisations

Degree Programme in Vehicle Engineering (CFATE)

This programme has no specialisations.