



Programme syllabus

Master's Programme, Vehicle Engineering, 120 credits

Masterprogram, fordonsteknik

120.0 credits

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

Vehicle Engineering is a broad subject of engineering science driven by an ever increasing degree of mobility in the world. Transport, however, has to face the challenge to minimise the environmental impact it causes. New technical solutions are therefore needed in the future to make a transition to sustainable road and rail transport.

The objective of this programme is to educate engineers for a global industry, administrations and research institutions active in this area. It is a joint effort by several KTH departments, providing leading expertise in their respective areas of research. The Department of Aeronautical and Vehicle Engineering coordinates the programme and provides about half of the courses.

Knowledge and understanding

A person with a Master of Science in Vehicle Engineering shall be competitive on an international market and will have:

- deep knowledge and understanding in the chosen field of technology and proven experience.
- deeper methodological knowledge, including the ability to apply theoretical knowledge on engineering problems.
- as well as deeper insight into current program of research development.

Skills and abilities

A person with a Master of Science in Vehicle Engineering will have:

- ability to with a holistic view critically, independently and creatively identify, formulate and manage complex problems.
- an ability to create, analyze and critically evaluate different technical solutions.
- an ability to plan and use appropriate methods, carry out advanced tasks within a given framework and evaluate this work.
- the skill required to participate in research and development work or to work independently in other qualified areas and thereby contribute to knowledge development.
- the capacity for teamwork and collaboration in groups with different composition.
- an ability to both in national and international groups, orally and in writing clearly explain and discuss their conclusions and the knowledge and the arguments underlying these.

Ability to make judgements and adopt a standpoint

A person with a Master of Science in Vehicle Engineering will:

- have an ability to make judgments with regard to relevant scientific, social and ethical aspects, and demonstrate awareness of ethical aspects of research and development.
- show insight regarding the possibilities and limitations of engineering science and its role in the society.
- be able to identify the need for further knowledge and take responsibility for keeping personal knowledge up to date.

Complete information on the degree requirements can be found in the local degree policy of KTH, see www.kth.se.

Extent and content of the programme

Vehicle Engineering is a two-year (120 university credits) master programme on the advanced level (second cycle). The instruction language is entirely English. After a short introductory part the programme consists of two basic specializations, i.e. road vehicles and rail vehicles. See Appendix 2 for a description of the specializations.

Eligibility and selection

General eligibility requirements

A completed Bachelor's degree, corresponding to a Swedish Bachelor's degree (180 ECTS), or equivalent academic qualifications from an internationally recognised university. Students in their final year of undergraduate education may also apply to KTH and if qualified, receive a conditional acceptance.

The general requirements are the same for all master programmes at KTH: www.kth.se.

Specific eligibility requirements

A good knowledge of written and spoken English is required. Applicants must provide proof of their proficiency in English, e.g. reporting his/her TOEFL test score (Teaching Of English as a Foreign Language).

For more information see: <https://www.kth.se/en/studies/master/vehicleengineering/entry-requirements-1.48236>

The applicant must have a basic degree, Bachelor's or similar, from a vehicle, mechanical engineering, or similar programme with sufficient theoretical depth and good academic results. Course work must include linear algebra, differential and integral calculus, differential equations, transforms, numerical analysis, rigid body mechanics, solid mechanics, fluid mechanics, thermodynamics and control theory.

The specific requirements may be assessed as not fulfilled if:

- the total points of mathematics is lower than 25 ECTS (including linear algebra, differential and integral calculus, differential equations, transforms, numerical analysis)

It is recommended but not required to have some previous knowledge in MATLAB/Simulink or similar software.

Selection process

The selection process is based on a total evaluation of the following criteria: University, Cumulative Grade Point Average (CGPA), relevant course work, relevant work experience and motivation to study. The evaluation scale is 1-75. The applicant may get a lower evaluation score if a filled-in program-specific summary sheet is missing from the application documents.

Implementation of the education

Structure of the education

The academic year at KTH, starting in end of August / early September and ending in late May/ early June, is divided into four study periods. Each period lasts approximately seven weeks with at least 33 days of study. Each period is followed by an exam period. The academic year has a duration of 40 weeks. Teaching activities may, if necessary, be scheduled outside the academic year.

Courses

The programme is course-based. Lists of courses are included in [appendix 1](#).

There are a few compulsory courses in common for all students and then the compulsory courses depend on the chosen specialization; road or rail. The description of the two specializations can be found in Appendix 2. In total the basic curriculum corresponds to 55.5 (road) / 52 (rail) credits (excluding the degree project of 30 credits).

In order to create a own profile of the education the students shall then choose conditional compulsory courses from the specified course list in Appendix 1, so that together with the courses from the basic curriculum the sum of university credits is at least 75 credits (excluding the degree project of 30 credits). This leaves about 15 credits for optional (elective) 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.

The grades pass (P) and fail (F) are used for thesis works.

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

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.

Recognition of previous academic studies

Under certain circumstances, and in agreement with the programme director, credits for previous studies can be received according to the local policy of KTH.

Studies abroad

After approval by the programme director, part of the studies may be carried out abroad (including the Master's degree project). The condition is that the parts of the programme carried out abroad should fit in with the educational programme.

Degree project

Students admitted to the programme are required to perform an independent study in the form of an MSc thesis project corresponding to 30 university credits. The project work may begin when special admission requirements for the course are fulfilled.

The purpose of the thesis project is that the student should demonstrate the ability to perform independent project work, using and developing the skills obtained from the courses in the programme. The thesis project can either be performed at a university or, more commonly, at a company. The student must actively search for a suitable thesis project in industry; however KTH will provide some assistance with information on suitable points of contact. www.kth.se

The degree project is graded with Pass or Fail.

Degree

In order to earn Degree of Master of Science in Vehicle Engineering (120 credits), passing grades in all courses which are included in the student's study plan are required. The study plan must comprise 120 higher education credits which include a degree project consisting of 30 higher education credits, in the second cycle.

KTH's local degree ordinance can be found at KTH's website, www.kth.se.

Application for degree certificate

Students shall apply for a degree through the web service by logging into your Personal menu/Applications for degrees at www.kth.se

[Appendix 1 - Course list](#)

[Appendix 2 - Programme syllabus descriptions](#)



Appendix 1: Course list

Master's Programme, Vehicle Engineering, 120 credits (TFORM), Programme syllabus for studies starting in autumn 2018

General courses

Year 1

Conditionally elective courses

Course code	Course name	Credits	Edu. level
AF2901	Road- and Railway Track Engineering	7.5	Second cycle
AH2170	Transport Data collection and Analysis	7.5	Second cycle
AH2171	Traffic Engineering and Management	7.5	Second cycle
AH2174	Traffic Simulation Modelling and Applications	7.5	Second cycle
AH2307	Urban Modeling and Decision Support	7.5	Second cycle
EL2520	Control Theory and Practice, Advanced Course	7.5	Second cycle
MF2007	Dynamics and Motion Control	9.0	Second cycle
MF2030	Mechatronics basic Course	6.0	Second cycle
MF2043	Robust Mechatronics	6.0	Second cycle
SD2111	Engineering Acoustics	6.0	Second cycle
SD2150	Experimental Structure Dynamics, Project Course	9.0	Second cycle
SD2155	Flow Acoustics	6.0	Second cycle
SD2190	Vehicle Acoustics and Vibration	6.0	Second cycle
SD2231	Applied Vehicle Dynamics Control	7.5	Second cycle
SD2411	Lightweight Structures and FEM	8.0	Second cycle
SD2416	Structural Optimisation and Sandwich Design	6.0	Second cycle
SD2625	Computational Road Vehicle Aerodynamics	3.0	Second cycle
SG2211	Vehicle Aerodynamics	6.0	Second cycle
SG2214	Fluid Mechanics	7.5	Second cycle

Supplementary information

Compulsory courses + conditionally elective courses + ev courses from the other track = at least 75 cr.

Year 2

Conditionally elective courses

Course code	Course name	Credits	Edu. level
AF2901	Road- and Railway Track Engineering	7.5	Second cycle
AH2170	Transport Data collection and Analysis	7.5	Second cycle
AH2171	Traffic Engineering and Management	7.5	Second cycle
AH2174	Traffic Simulation Modelling and Applications	7.5	Second cycle
AH2307	Urban Modeling and Decision Support	7.5	Second cycle
MF2030	Mechatronics basic Course	6.0	Second cycle
MF2043	Robust Mechatronics	6.0	Second cycle
SD2111	Engineering Acoustics	6.0	Second cycle
SD2190	Vehicle Acoustics and Vibration	6.0	Second cycle
SD2230	Vehicle Dynamics Project Course Part 2	7.5	Second cycle
SD2411	Lightweight Structures and FEM	8.0	Second cycle
SD2416	Structural Optimisation and Sandwich Design	6.0	Second cycle
SG2214	Fluid Mechanics	7.5	Second cycle

Supplementary information

Compulsory courses + conditionally elective courses + ev courses from the other track = at least 75 cr.

Year 3

Track, Automotive (FORA)

Year 1

Mandatory courses (40.5 credits)

Course code	Course name	Credits	Edu. level
EJ2410	Hybrid Vehicle Drives	7.5	Second cycle
MF2047	Internal Combustion Engines 1	6.0	Second cycle
SD2221	Vehicle System Technology	8.0	Second cycle
SD2222	Vehicle Components	8.0	Second cycle
SD2225	Ground Vehicle Dynamics, Basic Course	11.0	Second cycle

Year 2

Mandatory courses (28.5 credits)

Course code	Course name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5	Second cycle
EJ2410	Hybrid Vehicle Drives	7.5	Second cycle
MF2047	Internal Combustion Engines 1	6.0	Second cycle
SD2229	Vehicle Dynamics Project Course Part 1	7.5	Second cycle

Year 3

Track, Railway (FORB)

Year 1

Mandatory courses (29.5 credits)

Course code	Course name	Credits	Edu. level
EJ2400	Electric Traction	6.0	Second cycle
SD2221	Vehicle System Technology	8.0	Second cycle
SD2307	Rail Vehicle Technology	7.5	Second cycle
SD2313	Rail Vehicle Dynamics	8.0	Second cycle

Year 2

Mandatory courses (22.5 credits)

Course code	Course name	Credits	Edu. level
AH2029	Railway Signalling System	7.5	Second cycle
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5	Second cycle
SD2229	Vehicle Dynamics Project Course Part 1	7.5	Second cycle



Appendix 2: Specialisations

Master's Programme, Vehicle Engineering, 120 credits (TFORM), Programme syllabus for studies starting in autumn 2018

Track, Automotive (FORA)

The road vehicle specialisation includes all types of road vehicles with main focus on cars, trucks and buses. The specialisation gives a basic knowledge of vehicle components and their functionality including modeling, validation and analysis. Furthermore, it also gives a deeper knowledge on how to model, simulate, measure and evaluate the dynamic behavior of road vehicles.

Track, Railway (FORB)

In the rail vehicle specialisation the system aspect is very important, since the different parts of a railway system like vehicle, track, electrification system and signal system strongly influence each other. Besides a broad overview on all aspects of rail vehicles traffic, dynamic vehicle-track interaction is one of the focus areas.