



# Programme syllabus

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

## Master's Programme, Vehicle Engineering 120 credits

Masterprogram, fordonsteknik

*Valid for students admitted to the education from autumn 10 (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 Master of Science in Vehicle Engineering shall be competitive on an international market and will have:

- good theoretical knowledge in the field.
- the ability to apply theoretical knowledge on engineering problems.
- the ability to solve problems with scientific methodology.

## Skills and abilities

A Master of Science in Vehicle Engineering will have:

- experience of solving technical problems by work in projects.
- experience of work in an international environment.
- the ability to communicate results and conclusions in a competent and intelligible manner, both orally and in writing.

## Ability to make judgements and adopt a standpoint

A Master of Science in Vehicle Engineering will:

- be able to make decisions based on relevant scientific, societal and ethical aspects.
- 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 <http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina>

## 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 tracks, i.e. road vehicles and rail vehicles, followed by four different profiles: structural design, functional design, control design and transport systems.

# Eligibility and selection

## Basic eligibility requirements

A completed Bachelor's degree, equivalent to a Swedish Bachelor's degree (180 university credits), from a university recognized by government or accredited by other recognized organization. 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).

## Specific eligibility requirements

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.

## Selection process

The selection process is based on a total evaluation of the following criteria: University, Grade Point Average (GPA), relevant course work and motivation to study.

Complete information on the eligibility requirements can be found at the local admission policy of KTH, see <http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/antagning/1.27192>

# Implementation of the education

## Structure of the education

The academic year at KTH, starting in early September and ending in late May, 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. In addition to the four regular exam periods, there are three additional re-examination periods: after Christmas, after May and the days preceding the first study period of the academic year. The academic year has a duration of 40 weeks. Teaching activities may, if necessary, be scheduled outside the academic year.

The first year in the programme is mainly dedicated to the compulsory courses in the basic curriculum. The second year mainly consists of elective courses and the final degree project.

## Courses

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

The programme is course-based. A list of courses can be found in Appendix 1. The basic curriculum comprises of a short introductory part and one of the two tracks and corresponds to approximately 45 university credits.

Three of the courses listed in the chosen profile have to be taken. Further courses from the own profile, from the other three profiles or from the second track have to be taken. Together with the courses from the basic curriculum the sum of university credits has to be at least 75. This leaves about 15 university credits for optional (elective) courses. The structure of the programme is visualized in Figure 1.

## 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.

## Conditions for participation in the programme

No later than November 15 and May 15 each academic year, respectively, the students are required to make a study registration and course selection for the coming semester. In order for the student to be promoted to the second year of the programme, at least 45 university credits have to be completed during the first academic year (including the re-examination period in August).

Students have to make a decision about the track into road or rail vehicles and about the chosen profile in the very beginning of the programme. The programme director will inform about the different options during the reception at KTH.

## 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, see <http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/prestationer/1.27200>

## Degree project

Students admitted to the programme are required to perform an independent study in the form of a MSc thesis project corresponding to 30 university credits. To begin the thesis project, a student must have completed at least 60 university credits of the total course work of which at least four of the six compulsory courses in the track (including the two common compulsory courses).

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. More information on the KTH policy on the degree project can be found at <http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examensarbete>

## Degree

Students who fulfill all the requirements will be awarded a Degree of Master of Science (two years, 120 university credits). Students must apply for the degree and also show proof of their basic degree (Bachelor's or similar). Complete information on the degree requirements can be found in the local degree policy of KTH, see <http://intra.kth.se/regelverk/utbildning-forskning/grundutbildning/examina>

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



# Appendix 1: Course list

## Master's Programme, Vehicle Engineering (TFORM)

### General courses

Year 1

#### Mandatory courses (8.0 Credits)

Code	Name	Credits	Edu. level
<a href="#">SD2221</a>	Vehicle System Technology *	8.0 hp	Second cycle

#### Optional courses

Code	Name	Credits	Edu. level
<a href="#">ME1003</a>	Industrial Management, Basic Course	6.0 hp	First cycle
<a href="#">MF2048</a>	Internal Combustion Engines 2	9.0 hp	Second cycle
<a href="#">SD2228</a>	Environmental Friendly Vehicle - Project Course	8.0 hp	Second cycle
<a href="#">SG2150</a>	Rigid Body Dynamic	7.0 hp	Second cycle

## Conditionally elective courses

Code	Name	Credits	Edu. level
AF2901	Road- and Railway Track Engineering <i>Profile Transport Systems</i>	7.5 hp	Second cycle
AH2300	Transport and Society <i>Profile Transport Systems</i>	7.5 hp	Second cycle
AH2302	Transport Modelling <i>Profile Transport Systems</i>	7.5 hp	Second cycle
EL2520	Control Theory and Practice, Advanced Course <i>Profile Control Design</i>	7.5 hp	Second cycle
MF2007	Dynamics and Motion Control <i>Profile Control Design</i>	9.0 hp	Second cycle
MF2030	Mechatronics basic Course <i>Profile Control Design</i>	6.0 hp	Second cycle
MF2042	Embedded Systems for Mechatronics, I <i>Profile Control Design</i>	6.0 hp	Second cycle
MF2043	Robust Mechatronics <i>Profile Control Design</i>	6.0 hp	Second cycle
MF2044	Embedded Systems for Mechatronics, II <i>Profile Control Design</i>	6.0 hp	Second cycle
SD2140	Vibro Acoustics <i>Profile Functional Design</i>	8.0 hp	Second cycle
SD2150	Experimental Structure Dynamics, Project Course <i>Profile Structural Design</i>	9.0 hp	Second cycle
SD2155	Flow Acoustics <i>Profile Functional Design</i>	6.0 hp	Second cycle
SD2190	Vehicle Acoustics and Vibration <i>Profile Functional Design</i>	6.0 hp	Second cycle
SD2411	Lightweight Structures and FEM <i>Profile Structural Design</i>	8.0 hp	Second cycle
SD2416	Structural Optimisation and Sandwich Design <i>Profile Structural Design</i>	6.0 hp	Second cycle
SD2625	Computational Road Vehicle Aerodynamics <i>Profile Functional Design</i>	3.0 hp	Second cycle
SG2211	Vehicle Aerodynamics <i>Profile Functional Design</i>	6.0 hp	Second cycle

## Supplementary information

\*For students who has not done a Degree project, first level, SD2221 is compulsory.

At least three of the conditionally elective courses has to be studied, depending on chosen profile.

### Year 2

#### Mandatory courses (7.5 Credits)

Code	Name	Credits	Edu. level
<a href="#">AK2036</a>	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5 hp	Second cycle

#### Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AH2171</a>	Traffic Engineering and Management <i>Profile Transport Systems</i>	7.5 hp	Second cycle
<a href="#">AH2172</a>	Transport Data collection and Analysis <i>Profile Transport Systems</i>	7.5 hp	Second cycle
<a href="#">AH2174</a>	Traffic Simulation Modelling and Applications <i>Profile Transport Systems</i>	7.5 hp	Second cycle
<a href="#">SD2450</a>	Biomechanics and Neuronics <i>Profile Structural Design</i>	6.0 hp	Second cycle
<a href="#">SE2132</a>	Applied Elasticity with FEM <i>Profile Structural Design</i>	9.0 hp	Second cycle

## Track, Automotive (FORA)

### Year 1

#### Mandatory courses (19.0 Credits)

Code	Name	Credits	Edu. level
<a href="#">SD2222</a>	Vehicle Components	8.0 hp	Second cycle
<a href="#">SD2225</a>	Ground Vehicle Dynamics, Basic Course	11.0 hp	Second cycle



## Year 2

### Mandatory courses (13.5 Credits)

Code	Name	Credits	Edu. level
<a href="#">EJ2410</a>	Hybrid Vehicle Drives	7.5 hp	Second cycle
<a href="#">MF2047</a>	Internal Combustion Engines 1	6.0 hp	Second cycle

## Track, Railway (FORB)

### Year 1

### Mandatory courses (21.5 Credits)

Code	Name	Credits	Edu. level
<a href="#">EJ2400</a>	Electric Traction	6.0 hp	Second cycle
<a href="#">SD2307</a>	Rail Vehicle Technology	7.5 hp	Second cycle
<a href="#">SD2313</a>	Rail Vehicle Dynamics	8.0 hp	Second cycle

## Year 2

### Mandatory courses (7.5 Credits)

Code	Name	Credits	Edu. level
<a href="#">AH2026</a>	Railway Traffic - Market and Planning, Basic Course	7.5 hp	Second cycle



# Appendix 2: Specialisations

## Master's Programme, Vehicle Engineering (TFORM)

### Track, Automotive (FORA)

The road vehicle track includes all types of road vehicles with main focus on cars, trucks and buses. The track 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 track the system aspect is very important, since the different parts of a railway system like vehicle, track, electrification system and signalling system strongly influence each other. Besides a broad overview on all aspects of railway traffic, dynamic vehicle-track interaction is one of the focus areas.