



Programme syllabus

Master's Programme, Railway Engineering, 120 credits

Masterprogram, järnvägsteknik

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

Railway transport is experiencing a worldwide renaissance. The technical challenges associated with meeting the growing demand for railway transportation in an efficient and sustainable manner require a considerable number of engineers with education in the field of railways. A large percentage of railway industry engineering staff are nearing retirement, consequently, there is strong and growing demand for graduates with education in railway engineering.

The objective of this programme is to educate engineers for a global industry, administrations and research institutions active in this area. The programme is offered by the Royal Institute of Technology (KTH), in a cooperation with the University of Illinois at Urbana Champaign (UIUC). Together the two universities provides leading expertise in their respective areas of research. The school of Engineering Sciences coordinates the programme at KTH.

Knowledge and understanding

A Master of Science in Railway 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 research and development.

Skills and abilities

A Master of Science in Railway 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 Master of Science in Railway 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

Railway Engineering is a two-year (120 university credits) master programme on the advanced level (second cycle). The instruction language is entirely English. About half of the courses are given by UIUC and KTH respectively. The program also includes mobility. At least 15 ECTS credits have to be taken on site at UIUC.

Many courses are taught online by KTH and UIUC specifically for this program. Examination of these courses is not on-line, but at each university.

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.

English language proficiency equivalent to (the Swedish upper secondary school) English course B/6.

Students in their final year of undergraduate education may also apply to KTH and if qualified, receive a conditional acceptance.

Specific eligibility requirements

The applicant must have a basic degree, Bachelor's or similar, from mechanical, civil, vehicle engineering, or a similar programme with sufficient theoretical depth and good academic results. Course work must

include linear algebra, differential and integral calculus, differential equations, transforms, rigid body mechanics, solid mechanics.

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, previous studies (for instance GPA), motivation for the studies (for instance letter of motivation, references). 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 UIUC and KTH, starting in end of August / early September and ending in late May/ early June, is divided into two semesters. At KTH each semester is divided into two 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 four additional re-examination periods: after Christmas, April, after May and immediately proceeding 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.

Courses

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

The programme comprises of about 75 ECTS credits compulsory courses. About half of the compulsory courses are offered by UIUC and KTH respectively. This leaves about 15 credits for optional (elective) courses. The degree project corresponds to 30 ECTS credits.

To create your own profile on the education students must also choose conditionally elective courses the course list in Annex 1, so that the sum, together with the required courses, amounting to at least 75 credits (plus).

Courses from the UIUC will be counted in the Swedish exam.

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.

Course application

As a student at KTH programmes you have to apply for semester courses. The application is done via universityadmission.se and by all programme students.

Recognition of previous academic studies

Both classes taught on-site and online courses at UIUC in the context of education, will be transferred to the Swedish exam.

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

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

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, Railway Engineering, 120 credits (TJVTM),
Programme syllabus for studies starting in autumn 2018

Programme syllabus

Established Programme syllabus as PDF:

- [Valid for studies starting in autumn 2018](#)

General courses

Year 1

Mandatory courses (29.0 credits)

Course code	Course name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5	Second cycle
EJ2400	Electric Traction	6.0	Second cycle
SD2307	Rail Vehicle Technology	7.5	Second cycle
SD2313	Rail Vehicle Dynamics	8.0	Second cycle

Conditionally elective courses

Course code	Course name	Credits	Edu. level
AF2201	Bridge Design	7.5	Second cycle
AH2173	Public Transport	7.5	Second cycle
AH2301	Transport Policy and Evaluation	7.5	Second cycle
SD2231	Applied Vehicle Dynamics Control	7.5	Second cycle
SG2211	Vehicle Aerodynamics	6.0	Second cycle

Supplementary information

Compulsory course studied online at UIUC the first year:

CEE409 Railway Track Engineering, 8 cr, Given Autumn 2018

Conditionally Elective courses studied online at UIUC the first year. *Among CEE408 and CEE472 at least one course has to be studied.

*CEE408 Railroad Transportation Engineering, 8 cr given Autumn 2018

*CEE472 Structural Dynamics I, 8 cr given Autumn 2018

CEE410 Railway Signalling and Control, 7,5 cr given Spring 2019

Mandatory courses + conditionally elective courses = at least 44,5 cr.

Supplementary information

Autumn semester year 2 is studied at UIUC (exchange semester).

Compulsory course

CEE412 High-Speed Rail Engineering, 7,5 hp

Conditionally elective courses. At least 22,5 cr has to be studied.

CEE408 Railway Transportation Engineering, 8 cr

CEE498 High-Speed Rail Planning, 7,5 cr

CEE509 Transportation Soils, 8 cr

CEE472 Structural Dynamics I, 7,5 cr

CEE491 Decision and Risk Analysis, 7,5 cr

CEE512 Logistics, 10 cr

CEE598 Railway Terminal Design and Operations, 10 cr

CEE491 Concrete Materials, 10 cr



Appendix 2: Specialisations

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

Programme syllabus

Established Programme syllabus as PDF:

- [Valid for studies starting in autumn 2018](#)

This programme has no specialisations.