



**KTH Aeronautical
and Vehicle Engineering**

14 October 2018
Rev. 0

Course programme

Rail Vehicle Technology (SD2307), 7.5 credits

Academic year 2018/2019, period 2 (Oct 2018 - Jan 2019)



Aim of the course

The overall course aim is to describe the components and functions of rail vehicles as well as the various demands a rail vehicle must fulfil. The course should give you a good platform for work in the field of rail vehicle engineering.

After a completed course you should, among other things, be able to:

- explain how bogies, carriages, traction and brake systems work and can be improved
- calculate train performance like acceleration and braking capacity, average speed and energy usage
- determine outer dimensions and interior design for a train at a given operational task
- discuss the trends and future potential for rail vehicles

Course main contents

Introduction to rail vehicles. Rail vehicles - technical basis. Running resistance and aerodynamics phenomena. Running gear, bogies and carbody tilting. Vehicle traction: mechanics, motors, transmission and current collection. Vehicle braking: braking systems and control. Car bodies: mechanics, interior design, comfort systems and passenger environment. Internal noise and vibrations; climate resistance. Rail vehicle market and vehicle development.

Previous knowledge

Fundamentals of mechanical and electrical engineering. The KTH course SD2221 Vehicle System Technology is recommended.

Teachers

CC = Carlos Casanueva, associate professor, course leader	carlosc@kth.se
MB = Mats Berg, professor,	mabe@kth.se
SSt = Sebastian Stichel, professor	stichel@kth.se
TK = Tomas Karis, PhD student	tkaris@kth.se
ZL = Zhendong Liu, PhD student	zhendong@kth.se

Course documentation

The digital documentation consists of powerpoint slides and recordings as well as project task and sample written exams. It is available on the KTH web system Canvas.

A printed textbook is also available for 300 SEK for programme students (600 SEK for persons taking SD2307 as a single course; “fristående studerande”).

UIUC and Online students: books for each student has been sent to UIUC, contact your program manager for further details. Other online students please contact the course responsible (carlosc@kth.se).

Course assessment

Written exam (4.5 credits)

A five-hour written exam given at 10th of January 2019 at 08:00-13:00. The course documentation above must not be used during the exam. A maximum of 40 points can be achieved; for pass at least 20 points are required.

UIUC and Online students: For UIUC students, an earlier exam will be arranged during week 51, exact day to be defined before December. Other online students who need special arrangements please contact the course responsible (carlosc@kth.se).

If you got the grade Fx you get the possibility of a supplementary written exam. Such an exam will comprise of parts where you obviously need to improve. Usually 5 points can be achieved, while 3 points are needed for passed. The time available is one hour (60 minutes). The supplementary exam must be written within six weeks after the result has been announced. After that period grade Fx will be changed to F (not passed).

Project task (3 credits)

Work carried out in groups of 2-3 persons on “Principle design of a fast train for regional traffic”. The task includes three *compulsory* lectures:

- Introduction of the task (8th of November at 09:30-10:00)
- Intermediate presentation (26th of November at 9:15–11:00)
- Final presentation (12th of December at 15:15-18:00)

A project report is to be submitted by the 4th of January 2019.

If submitted in time, the report can give you up to 10 bonus points.

UIUC and Online students: For UIUC students, presentation slides are to be sent to the course responsible (carlosc@kth.se) the day before each presentation (25th of November and 11th of December respectively). A videoconference schedule will be arranged for each group the week before the KTH presentation. A project report is to be submitted by the 14th of December 2018.

Final grade

The possible bonus points are added to the points of the passed written exam, i.e. you must always have at least 20 points (pass) at the written exam; e.g. 17 points on the written exam and 3 bonus points is not sufficient for the mark E.

0.0 - 17.9 points:	grade F	
18.0 – 19.9 points:	grade Fx	not passed

20.0 – 25.9 points:	grade E	passed
26.0 – 31.9 points:	grade D	
32.0 – 37.9 points:	grade C	
38.0 – 43.9 points:	grade B	
44.0 – 50.0 points:	grade A	

Schedule

Hour	Room	Chap.	Contents	Teacher
Mon 29/10	10-12 VEL	-	Introduction, rail vehicle overview	CC
Wed 31/10	15-17 VEL	12	Vehicle mass, adhesion, tractive forces	MB
Thu 1/11	08-10 VEL	12	Vehicle gauging	TK
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Tue 6/11	08-10 VEL	13	Vehicle running resistance, aerodynamics	CC
Wed 7/11	16-18 VEL	14	Running gear & bogies	SSt
Thu 8/11	08-10 VEL	14	Running gear & bogies, Project task intro	SSt, MB
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Mon 12/11	13-15 VEL	14, 15	Carbody tilting, traction mechanics	SSt, MB
Wed 14/11	15-17 VEL	15	Electric/diesel traction	ZL
Thu 15/11	08-10 VEL	15	Electric/diesel traction, carbody mechanics	ZL, CC
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Mon 19/11	10-12 VEL	17	Carbody mechanics	CC
Wed 21/11	15-17 VEL	16	Braking	CC
Thu 22/11	08-10 VEL	16	Braking, cont.	CC

Mon	26/11	09-11	VEL	18	Project task: Intermediate presentation	CC
Thu	29/11	08-10	VEL	-	Carbody interiors and comfort systems	MB
Mon	3/12	13-15	VEL	19, 20	Interior noise etc, rail vehicle development	SSt
Thu	6/12	08-10	VEL	-	Pantograph dynamics	ZL
Wed	12/12	15-18	VEL	-	Project task: Final presentation	CC
Thu	10/1	08-13	Hugin	-	Written exam	-

Lecture rooms (see KTH map on next page):

VEL = Vehicle Engineering Laboratory, Teknikringen 8, ground floor

Hugin = Teknikringen 8, ground floor

