



SD2625 Computational Road Vehicle Aerodynamics 3.0 credits

Fordonsaerodynamiska beräkningar

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Specific prerequisites

Basics course in fluid mechanics, such as SG1217 (for T), SG1220 (for M), SG1223 (for F), or equivalent.

English B / English 6

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

At the end of the course the students should be able to:

- Explain the key concepts involved in CFD for road vehicle aerodynamics in terms of modelling simplifications, accuracy, performance and validation.
- Perform CFD simulations using software and troubleshoot basic problems that arise.
- Reflect on and choose appropriate modelling and analysis approaches for road vehicle aerodynamics applications.
- Evaluate and critically judge simulation results in terms of errors and uncertainties in order to suggest improvements from both physical and computational modelling perspectives.

Course contents

The course covers the main considerations and attributes of computational fluid dynamics (CFD) that are specifically relevant for its application to road vehicle aerodynamics; the numerical solving of partial differential equations using a time and space discretization schemes; the choice of boundary conditions and initial data; the modelling of turbulent flow and approximations included in RANS, LES, DES and DNS; The course has five lectures: 1. Introduction, 2. Discretisation in space and time, 3. Grids, 4. Boundary and initial conditions, and 5. Turbulence modelling. There are also five computer labs in which case studies are explored the CFD software Fluent.

Examination

- PRO1 - Project, 3.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

The examination is a written report.

In addition, to pass the course, lab reports for lab 1, 2 and 3 and participation in lab 4 is compulsory.

Other requirements for final grade

To be approved at the course the student must

- Perform a small project in lab 5 that is presented in a written individual full report of acceptable quality and have the report approved.
- Perform the work in lab 1-3 and present the work in short individual reports. The scopes of the reports are given in the lab instructions.
- Perform the work in lab4 and participate and contribute to the oral discussion at lab 4. The scope of the report is given in the lab instructions.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.