SD2191 Vehicle Acoustic and Vibrations 6.0 credits

Fordonsakustik och vibrationer

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

Establishment

The official course syllabus is valid from autumn semester 2026 as decided by the Director of First and Second Cycle Education. Decision date: 2026-04-15

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Completed undergraduate degree project in the main field of engineering

Completed course in differential equations

Completed course in solid mechanics

English B/ English 6

Intended learning outcomes

After completing the course, the student will:

- Summarize the most important sound and vibration sources in road vehicles and their wave propagation paths in different frequency ranges depending on the vehicle's operating conditions.
- Explain and be able to apply basic principles for the integration of sound and vibration properties from a system and subsystem perspective in product development projects.
- Explain and be able to apply strategies for sound and vibration attenuation in road vehicles.
- Explain legal requirements for road vehicles and the impact of noise from road vehicles on society.
- Explain and calculate uncoupled and coupled structure-acoustic eigenmodes and frequency response system responses and summarize the results in the form of design parameters.
- Explain the overall perspective in product development of road vehicles with regard to sound and vibration in relation to other properties such as crash safety and vehicle dynamics.
- Explain and analyze tonal noise for driveline systems from a customer perspective.
- Apply computer-based analysis methods for sound and vibration in vehicle systems.
- Define and design acoustic materials for road vehicles.

Course contents

Overview of the most important sound and vibration sources with wave propagation paths in road vehicles. Methodology for integration of sound and vibration properties from a system and subsystem perspective in product development projects. Strategies for sound and vibration control in road vehicles. Analysis of structure-borne sound with fluid-structure interaction. Acoustic materials in road vehicles. Modeling and wave propagation analysis. Methodology for technical requirements with decomposition into subsystems and components. Analysis of tonal sound - sound quality. Legal requirements - external noise. Overview of methods for computer-based analysis of sound and vibration in road vehicles.

Examination

- INL1 - Assignments, 4.5 credits, grading scale: P, F
- TEN1 - Examination, 1.5 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.

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

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.