



# SD2111 Engineering Acoustics

## 6.0 credits

Teknisk akustik

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

Mechanical Engineering

### Specific prerequisites

English B / English 6

BSc degree in Mechanical Engineering or similar.

## Language of instruction

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

## Intended learning outcomes

The course aims at presenting the fundamental ideas and theories necessary to understand and analyse elastic wave phenomena in fluid or solid media. The course also gives an introduction to signal analysis and measurement techniques as well as human response to sound and vibration. The goal is to give the student a good understanding of the theory and illustrate important applications ranging from design of concert halls to quiet vehicles and low noise fans.

After the course students should be able to:

- Describe fundamental concepts of engineering noise and vibration, measurement techniques and instruments. Explain the effect of noise and vibrations on humans and equipment.
- Apply Fourier analysis to solve coupled differential equations, calculate the frequency content of periodic and transient signals and implement this knowledge to analyse mechanical systems. Describe methods to distinguish between linear and non-linear mechanical systems.
- Understand the physical foundations and the mathematical models of sound waves in fluids and solids, wave propagation, transmission, reflection and radiation and understand how to apply these models to sound and vibration problems in mechanical and vehicle engineering.

## Course contents

- Theory for elastic waves in fluids and solids
- Human response to sound and vibration
- Fourier methods, linear systems and frequency response functions
- Vibration isolation
- Vibrations in beams and plates
- Spherical and cylindrical sound waves
- Energy methods and room acoustics
- Flow Acoustics
- Sound in ducts and mufflers
- Measurement methods

Two measurement exercises are included in the course.

## Examination

- LAB1 - Measurement Course, 0.5 credits, grading scale: P, F

- TEN1 - Exam 1, 3.0 credits, grading scale: P, F
- TEN2 - Exam 2, 2.5 credits, grading scale: P, 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.

## Other requirements for final grade

Written theory examination (TEN1, 3 university credits), Written problem solving examination (TEN2, 2.5 university credits). Approved measurement exercises (LAB1, 0.5 university credits)

## 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.