



# FDT3318 Room Acoustics and Spatial Audio 7.5 credits

Rumsakustik och rumsligt ljud

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

## Establishment

Kursplanen gäller från och med HT 2024 enligt fakultetsnämndsbeslut: J-2024-0270.  
Beslutsdatum: 2024-10-08

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

No

## Language of instruction

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

## Intended learning outcomes

Be able to

- describe the fundamentals of statistical and geometrical room acoustics
- make basic calculations of room acoustic parameters for rectangular rooms
- describe the principles of directional hearing and how they relate to acoustics indoors
- make informed use of head-related impulse responses and transfer functions
- simulate simple scenarios with a few sound sources in virtual rooms that have given properties
- describe the characteristics of modern spatial audio techniques, including binaural, VBAP, Ambisonics, Dolby Atmos and wave-field synthesis

## Course contents

1-2 Fundamentals of room acoustics

Seminar and tutorial

Field assignment: measure RT in two chosen rooms using Schröder's reverse integration

3 Spatial hearing

ILD, ITD, HRTF

Lab – find your personal difference limen for direction

4 Room acoustics simulation

Conventional reverb – direct + early reflections + diffuse tail

Raytracing vs waveguide simulations

Lab session in COMSOL

5 Spatial audio reproduction – simulation of 'soundscapes'

Binaural, cinematic

Ambisonics, VBAP, wavefield synthesis

6 Virtual acoustics in VR-environments and telepresence

Guest lecturers from industry (Ericsson, ACAD)

7 Field trips to Stockholms Konserthus (active acoustics), KTH SCI MWL (anechoic room and more), KMH Lilla Salen, 28-channel speaker dome and dummy-head microphones

8 Presentations of individual project outcomes

## Examination

- EXA1 - Examination, 7.5 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.

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

Active participation in all seminars, preferably on location, remote participation will be possible.

Reading assignments and an individual project work. Performing simulations of sounds in rooms during the labs.

## Other requirements for final grade

Written personal reflections after each session.

## 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.