DT1174 Sound as an Information Medium 9.0 credits

Ljud som informationsbärare

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

Establishment

Course syllabus for DT1174 valid from Autumn 2012

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Single course students: completed upper secondary education including documented proficiency in Swedish corresponding to Swedish B, English corresponding to English A. Furthermore: 15 hp in mathematics.

Language of instruction

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

Intended learning outcomes

On completion of this course, you should be able to

- describe the different levels of representation in acoustic communication, and categorise given phenomena and problems to the correct level,
- make a qualified judgment as to whether communication by sound will work in different given circumstances, including distance, number of people, equipment, venue, programme material, ambient noise, user interfaces and storage media.

In order to reach these overall goals, you must be able to

- apply wave theory and concepts of elementary acoustics to describe how sound with different wavelengths from different sources will propagate in given environments,
- apply basic knowledge of the capabilities and limitations of human hearing in judging sounds for audibility, localisation and health hazards,
- make simple calculations of delays, RMS values, acoustic pressures, powers, intensities, levels in dB, and room acoustic metrics; and select formulas that are appropriate for solving a given problem,
- explain qualitatively what a spectrum of a sound represents, and how it may be modified by filters,
- account for acoustical and electrical particularities of common types of microphones and loudspeakers,
- describe at a functional level (such as block diagrams) how sound signals are represented and processed in analog and digital forms,
- use Matlab for performing basic mathematical operations on digitally stored sounds,
- recognise common types of distorsion and unwanted sounds by ear,
- account in general terms for how various features in speech and music signals are carriers of information,
- describe current speech technology with regard to main principles, application areas, potential and limitations.

Course contents

Lectures and tutorials: the communication chain, elementary acoustics, the ear and hearing, room acoustics, microphones and loudspeakers, analogue and digital representations of sound, stereo and spatial audio, digital audio technology, music as an information carrier, the human voice, speech technology.

Laboratories: measurements of one's own hearing, representation and distortion of signals, musical representation and musical expression.

Assignments: placement and properties of microphones, sound level measurements in the field, simple room acoustic measurements, basic sound manipulation in Matlab.

Field trip: patching exercise with a mixing desk, visit to a recording studio.

Disposition

The course is given in periods 1 and 2. A small checkpoint exam is given at the end of period 1, and the main exam is given toward the end of period 2 (before the exam period proper). Several group assignments, including practical measurement tasks, are carried out in unscheduled time. The three laboratories are strung out over the duration of the course.

Course literature

S. Ternström m.fl.: Ljud som informationsbärare. Kompendium, KTH CSC-TMH.

Examination

- INL1 - Hand in Task, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory work, 2.0 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.

In this course all the regulations of the code of honor at the School of Computer science and Communication apply, see: http://www.kth.se/csc/student/hederskodex/1.17237?l=en_UK.

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.