

# Acoustics and Audio Technology Major (AAT)

Prof Tapio Lokki (ELEC-SPA)

Prof Vesa Välimäki (ELEC-SPA)

POP Sebastian Schlecht (ARTS / ELEC)

Prof Ville Pulkki (ELEC-SPA)

Prof Lauri Savioja (SCI-CS)

## Objectives

The major in Acoustics & Audio Technology gives fundamental knowledge about acoustical phenomena, human hearing and audio technologies, and also facilitates the students to apply the knowledge in practice.

The fields of electroacoustics, room and building acoustics, noise, musical acoustics, and audio signal processing are focused in the studies. A central field in the studies is technical psychoacoustics studying human hearing mechanisms, which is a cornerstone in the development of acoustical and audio technologies for human listeners. The fields together constitute the field of communication acoustics, where there exists always a human listener at the end of the acoustic communication channel. Digital signal processing and machine learning is currently an important tool in acoustics and audio engineering, and the teaching also emphasizes the understanding of their general principles and of fundamental audio processing algorithms.

The target of the major is that the students could use their learning outcome flexibly in different tasks in industry and in academia. For example, the student should know why and how modern lossy audio codecs (mp3, AAC) work, or he/she should be able to measure, understand the perceptual aspects, and design the acoustics of a class room or a noise barrier. Some exemplar fields where the students are foreseen to be competent are sound recording and reproduction, audio coding, music technology, acoustic measurements, active noise cancellation, audio signal processing, room and building acoustics, and environmental noise.

The research conducted in Aalto University in the fields of this major has focused on following topics: spatial sound reproduction, concert hall acoustics, synthesis of musical instruments and natural sounds, loudspeaker and headphone reproduction, spatial sound psychoacoustics, digital filtering of audio signals, modeling of room acoustics, and deep learning for audio processing. The University is facilitated with top-level acoustical laboratories: three anechoic chambers, a standardized multichannel listening room, sound-proof listening booths, and immersive audiovisual environments.

## Courses

### Compulsory courses (30 credits)

CODE	NAME
ELEC-E5600	Communication Acoustics
ELEC-E5610	Acoustics and the Physics of Sound
ELEC-E5670	Acoustical Measurements
ELEC-E5620	Audio Signal Processing
ELEC-E5680	Virtual Acoustics
ELEC-EXXX	Seminar course

### Optional courses (10-35 credits)

ELEC-E5650	Electroacoustics
ELEC-E5640	Noise control
ELEC-E5660	Special assignment in Acoustics and Audio Technology
ELEC-E5410	Signal Processing for Communications
ELEC-E5420	Convex Optimization for Engineers

We are open for any crossdisciplinary studies to be included, also artistic ones.

### Usual paths to AAT

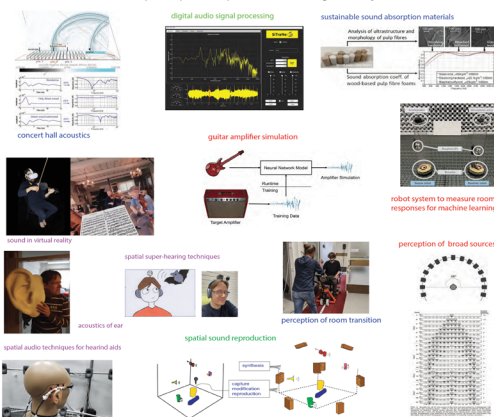
- Sähkötekniikan kandidaattiohjelma
- Informaatioteknologia
- Elektroniikka ja sähkötekniikka
- Teknistieteellinen kandidaattiohjelma
- Matematiikka ja systeemiteeet
- Teknillinen fysiikka
- Tietotekniikka
- Teknillinen psykologia

### Want to be an acoustic consultant at building sites?

- Complete our courses on acoustics
- Complete 10 cr on building technology

## Research in Aalto

Communication acoustics, Spatial sound, Audio DSP, Room acoustics measurements and perception, Speech technologies, Psychoacoustics



## Employment in Finland

### Audio technologies R/D

Nokia, Ericsson, Genelec, Huawei, Intel, Savox, Gradient, VLSI Solutions, catchBOX, Yousician, Songhi Entertainment, Remedy, oeksound



### Acoustic technologies R/D and import

VTT, Wärtsilä, Kone, Lautex, Ecophon, MIP Electronics, JTK Power, Noisetek, Paroc, Valtra, Tamrock, NL Acoustics, Lumir



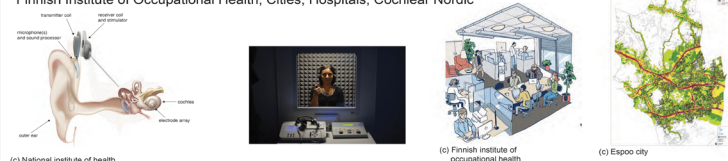
### Acoustic consultation

Akukon, Sitowise, Ramboll, Zenner, A-insinööri, Sito, Promethor, WSP Finland



### Environmental / health

Finnish Institute of Occupational Health, Cities, Hospitals, Cochlear Nordic



## Employment abroad

Apple, Dolby, Philips, Sennheiser, Meta, Fraunhofer IIS, Microsoft, Native instruments

## Facilities in Aalto

