Sound Studies and Sonic Arts

Summer Term 2026
Phase Focus
Module Listening
Course Title **Psychoacoustics, Sound Creation and Coding** | Lecture
Course Times and Location Fridays and Saturdays | see schedule for details | LIE 316/online – see schedule
Instructors Prof. Dr. Thomas Sporer
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Office Hours and Location upon request
Possible Credit Points Listening 2CP (NG), Listening 4CP (G), Free Focus 2CP/4CP (NG)

Course Description

This lecture covers three topics which are closely related:
Psychoacoustics is a discipline which tries to describe the perception of sound. In contrast to the physiology of hearing it is not targeting to explain the function of each part of the ear, but to measure the whole auditory sense respective what we are able to hear, to distinguish and to rank. In the lecture the principles of one- and two-ear listening are explained and demonstrated with audio examples. An important topic will also be the assessment of perceived quality, both with listening tests but also with measurement systems modelling human perception.

In the part about **sound creation** we will look into the basis of speech, organ pipes and strings. Starting with natural physical systems we will also explain some basics about computer models for sound creation. Again, we are not producing for computers and measurement systems, but for human beings, and perceived quality is the key goal.

Finally, the two parts "creation" and "perception" are brought together: **Speech coders**, like those in mobile phones, and **audio codecs**, like MP3 and AAC, exploit both properties of the source and the receiver. This part will also give hints about what to do and not to do when producing audio which might be coded.

Format: This is a lecture with some additional experiments to give hands-on experience. Students are invited to contribute with questions, observations and by telling own experience.

Target Audience: Everybody who wants to **understand** the human auditory sense might be interested. Everybody **producing** audio and using coding schemes should be interested. The lecture sometimes will also show some mathematical equations, but to understand these is only necessary if you want to program yourselves. Finally, you should be able to benefit from the knowledge even if you are only in front of a mixing console or audio workstation.

Requirements for Attending

The lectures will build on each other. Therefore, it is necessary to attend regularly.
Maximum of 22 students.

Schedule

Fr May 15	13:00 – 15:00 & 15:15 – 17:15	Introduction, digital audio (online)
Sa May 16	10:30 – 11:45 & 12:00 – 12:45	Psychoacoustics I (online)
Fr May 22	13:00 – 15:00 & 15:15 – 17:15	Psychoacoustics II (online)
Sa May 23	10:30 – 11:45 & 12:00 – 12:45	Psychoacoustics III (online)

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Fr June 5	13:00 – 15:00 & 15:15 – 17:15	Psychoacoustics IV and Audio Quality (LIE316)
Sa Jun 6	10:30 – 11:45 & 12:00 – 12:45	Sound Creation (LIE316)
Fr June 19	13:00 – 15:00 & 15:15 – 17:15	Speech and Audio Coding (online)

Times might be adjusted after first lecture. Exact allocation to slots might be changed if needed.

Exam / Credit Points

2CP (not graded: Listening, Free Focus): regular attendance. If you are missing more than one class, you need to take an oral exam on the classes you missed.

Consecutive assignment leading to a total of 4CP for the course (optional, graded: Listening, grading: only the consecutive assignment is graded; not graded: Free Focus): Oral exam – time and date on demand

Supporting Media

Fastl, Hugo, and Eberhard Zwicker. *Psychoacoustics: Facts and Models*. 3rd. ed. Springer Series in Information Sciences 22. Berlin; New York: Springer, 2007.

Blauert, Jens. *Spatial Hearing: The Psychophysics of Human Sound Localization*. Rev. ed. Cambridge, Mass: MIT *Press, 1997.*

Kahrs, Mark, and Karlheinz Brandenburg, eds. "Applications of Digital Signal Processing to Audio and Acoustics." The *Kluwer International Series in Engineering and Computer Science, SECS 437.* Boston: Kluwer, 1998.

Roginska, Agnieszka, ed. *Immersive Sound: The Art and Science of Binaural and Multi-Channel Audio*. New York, London: Routledge, 2017.

Online Repository

The presentations of this lecture will be made available to students subscribed to this lecture only.