Summary
The goal of this course is to introduce the engineering students state-of-the-art speech and audio coding techniques with an emphasis on the integration of knowledge about sound production and auditory perception through signal processing techniques.

Content
1. Introduction
Human speech production, Music production, Auditory perception, Brief overview on information theory and coding theory.

2. Applied Signal Processing
Brief overview on sampling and quantization, Discrete Fourier transform, Perfect reconstruction, Quadrature mirror filter, Modified discrete cosine transform, Stereo processing, Linear prediction (LP), Auditory filters, Auditory masking, Perceptual auditory models (Johnston's model, MPEG models), Spectral band replication, Temporal noise shaping.

3. Speech Coding

4. Audio Coding and Emerging Trends
Perceptual audio coders, MPEG-1, MPEG-2, MPEG-4, Dolby AC, Sony, AMR-WB, Generic coding.

5. Evaluation and Standardization of Audio and Speech coders
Objective evaluation techniques (PESQ, PEAQ), Subjective evaluation techniques (MOS, MUSHRA, BS.1116), Standardization (ITU).

6. Laboratory Exercises
Auditory perception models, Auditory filters, Estimation of masking threshold, Simple perceptual waveform coder, Objective quality evaluation techniques.

Keywords
Speech coding, Audio coding, Speech and music production, Auditory perception.

Learning Prerequisites

Recommended courses
Undergraduate level signal processing, programming in Matlab or similar.
Assessment methods
Multiple.

Resources
Websites
• http://lectures idiap.ch/