EE-719  
Digital Speech and Audio Coding  
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Cursus  
Génie électrique  

Sem.  
Sem.  

Type  
Obl.  

Language  
English  

Credits  
4  

Session  
Exam  

Workload  
120h  

Hours  
56  

Lecture  
30  

Exercises  
14  

Practical work  
12  

Number of positions  

Frequency  
Every 2 years  

Remarque  
Next time: Fall 2020  

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.

Note  
Course notes (and relevant book chapters) available.

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

Learning Prerequisites  

Digital Speech and Audio Coding
Recommended courses
Undergraduate level signal processing, programming in Matlab or similar.

Assessment methods
Multiple.

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