

Psychoacoustics

ECTS

3

Mots clés

Description du contenu de l'enseignement

Objectifs

As modern technology is becoming an inevitable aspect in our society, noise and its impact on humans is now a real issue in cities and transportation. Moreover, with the increasing development of computer-human interfaces, new functionalities are daily added to audio communication systems. These two issues deal with both “sounds” and “humans” and cannot be answered on the sole basis of acoustics and signal processing. Understanding associated human factors and the way to evaluate them, and more specifically hearing and related evaluation procedures is thus mandatory for those issues. Here, we propose an introductory course on psychoacoustic. The main objectives are to provide a general understanding of the human hearing process, and of the ways to perceptually evaluate some of its aspects.

Contenu

The course will begin with a short history of psychoacoustics and with some concrete examples highlighting the need for psychoacoustic approaches in current engineering challenges. Methodological tools will then be introduced and the physiology of the hearing process will be described. Once those basements have been put, elementary audition characteristics and perceptual attributes (such as loudness and pitch perception, sound source localization) of humans will be presented and discussed in details. Some of these aspects will be assessed practically during a lab session. Recent engineering examples that merge signal processing and acoustic with psychoacoustic will then conclude the course and link it with the other courses.

Compétences à acquérir

Compétences

- Understand the human hearing process
- Evaluate human factors associated to hearing

Compétences complémentaires

This course is interdisciplinary in its nature, at the frontier between science and humanities. It is thus an excellent opportunity for students having a scientific background to discover methodologies used in experimental psychology and to open their mind to these disciplines that are in general totally absent from their past formation.

Modalités d'organisation et de suivi

Coordinateur

Rébillat, Marc, Maitre de conférences, ENSAM

Équipe pédagogique

Xavier Boutillon, École polytechnique.

Langue

Anglais

Volume horaire

CM : 21h, TD : 9h

Bibliographie, lectures recommandées

William Hartmann « Signals, Sound and Sensation », Springer Science, 1997 Brian Moore, “An Introduction to the Psychology of Hearing”, Sixth Edition, 2013

Pré-requis obligatoires

Notions in linear acoustics Notions in signal processing

Période et lieu(x) enseignements

Période

A (septembre - novembre)

Lieu

ENSTA ParisTech

Mode de contrôle des connaissances

Written scientific report following a lab session. Written report and oral presentation of a scientific article on hearing.