EE-512

Biomedical signal processing

Vesin Jean-Marc

Cursus	Sem.	Type
Biomedical technologies minor	H	Opt.
Computer science	MA1, MA3	Opt.
Electrical and Electronical Engineering	MA1, MA3	Opt.
SC master EPFL	MA1, MA3	Opt.

Language of teaching	English
Credits	6
Session	Winter
Semester	Fall
Exam	Written
Workload	180h
Weeks	14
Hours	**6 weekly**
Lecture	4 weekly
Project	2 weekly
Number of positions	

Summary

The goal of this course is to introduce the techniques most commonly used for the analysis of biomedical signals, and to present concrete examples of their application for diagnosis purposes.

Content

1. Generalities on biomedical signal processing
2. Digital signal processing - basics

- sampling
- Fourier transform
- filtering
- stochastic signals correlation, and pwoer spectral density

3. Time-frequency analysis

- short-term Fourier transform
- time-frequency distributions, Cohen's class
- wavelet transform

4. Linear modeling

- autoregressive models
- linear prediction
- parametric spectral estimation
- criteria for model selection

5. Adaptive filtering

- adaptive predictione
- adaptive estimation of transfert functions
- adaptive interference cancellation

6. Miscellaneous

- polynomial models
- singular value decomposition
- principal component analysis

Keywords

signal processing, biomedical engineering, signal modeling, spectral analysis, adaptive filtering

Learning Prerequisites

Recommended courses

Signal processing for telecommunications COM-303
Signal processing EE-350

Teaching methods

lectures, lab sessions using Matlab

Assessment methods

1 point for lab/exercise sessions reports
2 exams: end of November 2points - final exam 3 points

Supervision

Office hours	Yes
Assistants	Yes