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Biomedical Signal Processing

1. SYLLABUS INFORMATION

1.1. Course title
Biomedical Signal Processing

1.2. University
Pázmány Péter Catholic University

1.3. Semester
1st year, 1st semester

2. COURSE DETAILS

2.1. Course nature
Elective

2.2. ECTS Credit allotment
4

2.3. Faculty data
Responsible lecturer: Dr Miklós Gyöngy
Further lecturers: Dr Janka Hatvani, Dr Márton Áron Goda

3. COMPETENCES AND LEARNING OUTCOMES

3.1. Course objectives
The purpose of the course is to introduce basic signal processing techniques relevant to biomedical signals and illustrate their practical applications.

3.2. Course contents
The lectures will cover the following topics: biomedical signal genesis, signal representation, signal decomposition, source separation, AR estimation, Fourier analysis, time-frequency analysis, wavelets, sparse decomposition, data fusion, classification, and non-stationary signals.
Examples of signal modalities considered include pulse oximetry, phonocardiography, ECG, and EEG.

3.3. Course bibliography
R M Rangayyan (2002): Biomedical Signal Analysis: A Case-Study Approach
L Sörnmo and P Laguna (2005): Bioelectrical Signal Processing in Cardiac and Neurological Applications
Mallat (2008): A Wavelet Tour of Signal Processing, 3rd edition, The Sparse Way

4. TEACHING AND LEARNING METHODOLOGIES AND STUDENT WORKLOAD

4.1. Contact hours
- Lecture: 2 hours/week
- Practice: 0 hour/week
- Lab: 2 hours/week

5. EVALUATION PROCEDURES AND WEIGHT OF COMPONENTS IN THE FINAL GRADE

5.1. End-term evaluation

End-term evaluation: practical mark.

Required knowledge: basic mathematics, physics, English, and MATLAB knowledge. The first two of these will be tested using an Initial Assessment that will allow the student to ascertain whether they have the required knowledge.

5.2. Final grade

Final grade calculation:

- 50% of marks come from group tasks during term,
- the other 50% of marks come from the end-of-term exam.
- In addition, extra marks may be awarded for active class participation.