EEL 5934 Biosignal Processing

Credits: 3 credits

Textbook, Title, Author, and Year: Bioelectrical Signal Processing in Cardiac and Neurological Applications by Leif Sornmo and Pablo Laguna. Elsevier Academic Press, 2005.

Reference materials: N/A

Specific Course Information

Catalog Description: Basics of bioelectrical signals, their acquisition, modeling and analysis.
Bioelectrical Signals: Electroencephalograms, Evoked potentials, Electromyograms, Electrocardiograms.
Processing tools: Linear filtering, autocorrelation and covariance, Fourier-based spectral analysis, the short-time Fourier transform, time-frequency analysis. Model-based spectral analysis.
Stochastic signals and noise reduction. Signal representation in orthogonal bases: Karhunen-Loeve and wavelet transforms. Adaptive filtering: Instantaneous and block LMS methods.

Prerequisites: Linear Systems or equivalent with permission of instructor.

Specific Goals for the Course: This course is intended to provide a comprehensive overview of techniques of processing bioelectrical signals. It will be problem-based and programming oriented. Students are expected to code in MATLAB at a level where they can use programming to verify and demonstrate concepts. Demonstration of work will be done with synthetically generated waveforms and real data.

Brief List of Topics to be covered:

1. Basics of Bioelectrical Signals
2. The Electrocardiogram Signal Processing
3. Evoked Potentials
4. The Electroencephalogram (EEG)
5. EEG Signal Processing
6. The Electromyogram