ELEG-636: Statistical Signal Processing

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Course Objectives & Structure

Objective: Given a discrete time sequence $\{x(n)\}$, develop

- Statistical and spectral signal representation
- Filtering, prediction, and system identification algorithms
- Optimization methods that are
  - Statistical
  - Adaptive

Course Structure:

- Weekly lectures [notes: www.ece.udel.edu/∼arce]
- Periodic homework (theory & Matlab implementations) [15%]
- Midterm & Final examinations [85%]

Textbook:

- Haykin, Adaptive Filter Theory.

Course Objectives & Structure

- Broad Applications in Communications, Imaging, Sensors.
- Emerging application in
  - Brain-imaging techniques
  - Brain-machine interfaces,
  - Implantable devices.
- Neurofeedback presents real-time physiological signals from MRIs in a visual or auditory form to provide information about brain activity. These signals are used to train the patient to alter neural activity in a desired direction.
- Traditionally, feedback using EEGs or other mechanisms has not focused on the brain because the resolution is not good enough.

Outline

Outline I

Blind Deconvolution

Adaptive equalizers typically require a training period during which they operate on known signals/statistics.
This known signal training is not always appropriate such as in mobile communications

- Cost is too high (time/bandwidth)
- Multipathing or other interference

In such cases, we must use blind equalization.