EEE 606 - Adaptive Signal Processing – Fall 2018

HYBRID / i-COURSE

Office hours: 2-330PM Mondays and Wednesdays. Others by Appointment.
Reference Texts: Ali H. Sayed, Adaptive Filters, Wiley, NJ, 2008 (ISBN 978-0-470-253885).

Adaptive Filter Theory by S. Haykin, Prentice Hall – 5th Edition – 2013

Chapters 8-9 from A. Spanias, Digital Signal Processing; An Interactive Approach – **2nd Edition**, 403 pages, Textbook with JAVA/MATLAB exercises, ISBN 978-1-4675-9892-7, Lulu Press On-demand Publishers Morrisville, NC, May 2014. http://www.lulu.com/shop/andreas-spanias/dsp-an-interactive-approach-second-edition/paperback/product-21640001.html
Review material in Lectures 1-6 also from the Interactive DSP Book

Other Readings: Journal papers and conference articles

Instructor: Andreas Spanias Phone 480 965 1837 spanias@asu.edu http://spanias.faculty.asu.edu/

Topics:
The course will cover selected topics from the book and from research papers: adaptive linear combiner, Mean square error, Wiener least-squares solution, Autocorrelation matrices, eigenvalues - eigenvectors and geometrical interpretation, Gradient search and performance surfaces, The LMS and the RLS algorithms, Block time and frequency domain LMS FIR and IIR adaptive filters, The Equation error model, Convergence, Noise and Echo Cancellation, Array processing, Intro to Neural Nets, Select algorithms and applications from recent papers.

Prerequisites: EEE407 and EEE506 or equivalents
This is an advanced course and requires EEE407 and EEE506 as pre-requisites. Registration requires instructor consent.

Prerequisites by Topic: Derivatives, Gradient techniques, Difference Equations, FIR and IIR Digital Filter Theory, z-transform, Fourier Transform, Discrete and Fast Fourier Transform, Random Signals, Expected Value, PDF, Stationarity, Ergodicity, Mean, Variance, Autocorrelation, PSD, Matrix Theory, Inverses, Pseudo-inverses, Eigenvalues, Eigenvectors, SVD, Principal Components, Properties of matrices, Least squares and weighted least squares, Linear Prediction, Array topology.

**** Must have basic knowledge of scientific programming (MATLAB or C)**

Course Content/Meetings: The course is hybrid. All content and lectures are videostreamed. You need to watch the lectures as scheduled on BB. Face to face meetings will be announced (roughly once every 3 weeks). Project proposal and final report presentations will be scheduled face to face towards the middle and end of the course respectively.

Meeting time Wednesdays 6PM at ECG335.

Homework/Projects
Homework will be assigned on a weekly basis. A computer project will also be assigned .
This will involve reading articles on specific algorithms and simulating them in the context of an application.
Deliverables include algorithm/application description, simulations, presentation material, and clear description of the educational value of the project to the student and the class in general.

Grading policy
Homework 10 %
Quizzes on Lectures: 10%
Test 25%
Final 25%
Computer Project 30%

Tests - Test Dates will be listed on the web site in the near future.