

## Beginning of Course Memo

### EEL 6935 - Smart Antennas

Spring 2018

#### 1. Schedule of Classes

Lectures: W F 2:00 pm-3:20 pm

#### 2. Instructor

Name: Dimitris A. Pados, Professor of Comp. and Elec. Eng. & Comp. Sc. and I-SENSE Fellow

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Office Hours: TU 9:00 am – 10:30 am; W 3:30 pm – 5:00 pm or by appointment

#### 3. Teaching Assistant (N/A)

Name:

E-mail:

Office Hours:

#### 4. Course Description

Technically speaking, there is no such thing as a smart antenna. The widely used term "smart antennas" refers to the intelligent manipulation of signals received by an array of antenna elements. Array processing of this form can easily raise the Signal-to-Noise ratio (SNR) of signals of interest, null-out or suppress interferers, identify the number of active signals and their direction-of-arrival and track the signal sources as they move in space. Due to these fundamental capabilities, array processing is playing a core role in modern mobile communication systems.

EE 6935 is a graduate level course designed to cover the underlying principles and the present state-of-the-art of smart antennas and array processing algorithms. While it is the intention of the instructor to keep EE 6935 somewhat self-sufficient, some basic working knowledge of communications systems, probability theory, and signal processing is assumed. The main topics of interest are deterministic beamforming, mean-square optimum beamforming, adaptive beamforming and direction-of-arrival estimation. Applications are sought in the context of space-time processing for wireless communications with examples from code-division-multiple-access (CDMA) systems.

Homework assignments may require use of Matlab (or equivalent) for computer analysis and simulation studies.

#### 5. Reference Material

The course is based on real-time developed classroom notes and there is no formally required textbook. The following texts can be considered as possible references:

*"Detection, Estimation, and Modulation Theory, Part IV, Optimum Array Processing,"* Harry L. Van Trees, Wiley, ISBN 478-0-471-09390-4.

*"Array Signal Processing, Concepts and Techniques,"* D. H. Johnson and D. E. Dudgeon, Prentice Hall, ISBN 0-13-048513-6.

*"Smart Antennas for Wireless Communications,"* J. C. Liberti, Jr. and T. S. Rappaport, Prentice Hall, ISBN 0-13-719287-8.

#### 6. Grading Policy

HWs: 30%. Midterm Test: 30%. Final Exam: 40%.