University of New Mexico, Albuquerque
Department of Electrical and Computer Engineering
ECE-595: Adaptive Filter Theory
Spring Semester 2017, 3 Credit Hours

COURSE INFORMATION:

Course Instructor	Prof. Balu Santhanam
Office Location	Room 326A, ECE Bldg.
Contact Info	Email: bsanthan@unm.edu
	Tel: (505) 269-0703
Prerequisite	ECE-539, ECE-541, knowledge of MATLAB
Location	ECE-215
Lectures	TR: 2:00 PM - 3:15 PM
Textbook	Adaptive Filter Theory
	Simon Haykin
	Fourth Edition, Prentice Hall Inc.
	New York , 2002
Office Hours	TBA

GRADING SCHEME:

Problem Sets/Computer Projects : 40%
Midterm Project, date TBA : 30%
Final Project : May 09, Tuesday, 12:00 PM, 30%

References

1. A. V. Oppenheim, R. W. Schafer, and J. R. Buck, "Discrete-Time Signal Processing," Third Edition, Prentice Hall Inc., Upper Saddle River, New Jersey, 1999.

2. Gilbert Strang and Truong Nguyen, "Wavelets and Filterbanks," Wellesley-Cambridge Press, Massachusetts, 1996.

3. P. P. Vaidyanathan, "Multirate Systems and Filterbanks," Prentice Hall Inc., Englewood Cliffs, New Jersey, 1993.

4. B. D. Widrow and S. D. Stearns, " Adaptive Signal Processing," Prentice Hall Inc., Upper Saddle River, New Jersey, 1985.

5. M. H. Hayes, "Statistical Digital Signal Processing and Modeling," John Wiley & Sons Inc., New York, 1996.

6. K. S. Shanmugan and A. M. Breipohl, "Random Signals: Detection, Estimation and Data Analysis," John Wiley & Sons, New York, 1988.

COURSE OUTLINE

The material covered in this course deals with aspects of adaptive filter theory and issues relating to the design of adaptive signal processing algorithms. This course has two aspects: (a) theoretical component, (b) applications component.

- Theoretical: We will specifically look at some of the popular adaptive filtering algorithms: (a) least mean square (LMS) algorithm and variants, (b) recursive least squares (RLS) algo- rithm and variants, (c) constant modulus algorithm (CMA) algorithm, (d) adaptive correlation enhancement (ACE) algorithm, (e) Kalman filtering, (f) extended Kalman filtering and variants. We will look at both the theoretical foundations as well as convergence issues in each case.

- Applications: For this aspect of the course we will look at the applications of adaptive filtering techniques to the problems of : (a) adaptive noise cancelation, (b) multiple target tracking, (c) channel equalization, (d) interference cancelation, (e) biomedical signal processing applications. The applications component will involve several MATLAB simulation exercises and literature survey in specific areas of adaptive filtering.