Syllabus
ASCI 73XX - SIGNAL PROCESSING II
Three hours lecture

Prerequisite:
ASCI 7304 (Signal Processing I) or consent of instructor.

Textbooks:
Proakis and D. Manolakis (1996). *Digital Signal Processing: Principles. Algorithms and Applications* , 3rd edition, Prentice Hall, Englewood Cliffs, NJ.

B. Widrow and Stearns (1995). *Adaptive Signal Processing*, Prentice Hall, Englewood Cliffs:NJ

M. El-Sharkawy (1996). *Digital Signal Processing Applications with Motorola's DSP56002 processor*, Prentice Hall, Englewood Cliffs, NJ.

Topics:
1. **Linear prediction and optimum linear filters** -Forward and backward linear prediction, solution of normal equations: Levinson-Durbin algorithm, Wiener filters
2. **Power spectrum estimation** - Estimation of spectra using the DFT from finite-duration observations of signals, non- parametric methods for power spectrum estimation (Welch, Bartlett methods), parametric methods for power spectrum estimation (Yule-Walker method, Burg method for the AR model parameters, sequential estimation methods)
3. **Adaptive signal processing** - The LMS algorithm, Newton algorithm, applications of adaptive signal processing: Noise cancellation, adaptive interference canceling (e.g., canceling 60 Hz in ECG)
4. **Signal processing using the Motorola DSP56002 -** Introduction to Motorola's assembler program, DSP56002 architecture and addressing modes, designing FIR filters and implementing them on the DSP56002 processor, implementing the FFT with the DSP56002
5. **Multirate signal processing** - sampling rate conversion, decimation and interpolation, applications of multirate signal processing - oversampling A/D and D/A conversion, sigma-delta converters

Grading:

Exams	40%
Final	25%
Projects	20%
Homework	15%

Assignments and projects:
The projects and assignments will require the use of MATLAB's Signal Processing Toolbox. Students will be asked to write MATLAB programs to process, filter and analyze real-life signals including speech signals and biological signals (e.g., EEG and ECG waveforms). In another project, students will be asked to develop code that can be run real-time on Motorola's DSP56002.

Grade Scale:

A	100-90%	B	89-80%		
C	79-70%	D	69-60%	F	59-0%

Disability Support Services

It is the policy of UALR to accommodate students with disabilities, pursuant to federal and state law. Any student with a disability who needs accommodation, for example in seating placement or in arrangements for examinations, should inform the instructor at the beginning of the course. The chair of the departments offering this course is also available to assist with accommodations. Students with disabilities are also encouraged to contact the Office of Disability Support Services, which is located in the Donaghey Student Center, Room 103, telephone 569-3143.

CLASS SCHEDULE
ASCI 73XX - SIGNAL PROCESSING II

Week 1: Review of Z-transform and analysis of discrete-time signals and systems

Week 2: Linear prediction and optimum linear filters

Week 3: Forward and backward linear prediction

Week 4: Solution of normal equations: Levinson-Durbin algorithm

Week 5: Wiener filters

Week 6: TEST 1, Power spectrum estimation - Estimation of spectra using the DFT

Week 7: Non-parametric methods for power spectrum estimation- Welch method, Bartlett method, parametric method for spcetrum estimation (Yule Walker, Burg methods)

Week 8: Adaptive signal processing - The LMS algorithm

Week 9: The Newton algorithm, applications of adaptive signal processing

Week 10: TEST 2, Noise cancellation, adaptive interference canceling

Week 11: Signal processing using the Motorola DSP56002 **-** Introduction to Motorola's assembler program

Week 12: Motorola's DSP56002 architecture and addressing modes

Week 13: Designing FIR filters and implementing them on the DSP56002 processor

Week 14: Implementing the FFT with the DSP56002,

Week 15: Decimation (downsampling) and interpolation

Week 16: Applications of multirate signal processing - Interfacing of digital systems with different sampling rates, oversampling A / D and D / A conversion, Review