Advanced Digital Signal Processing, ECE 782/882  
Department of Electrical and Computer Engineering, Old Dominion University  
Fall 2012, T 7:10pm - 9:50 pm, Aug. 25th – Dec. 7th, 2012  
Location: KH 224

INSTRUCTOR:  
Jiang Li, Assistant Professor,  
Department of Electrical and Computer Engineering  
Office: 1320 ECSB  
Phone: 757-683-6748  
Email: Jli@odu.edu

OFFICE HOURS: TR 10:00 – 11:30am (Other times by appointment).


PREREQUISITE:  
ECE 381 Introduction of Digital Signal Processing or consent of instructor.

COURSE DESCRIPTION:  
The main objectives of the course are to review time domain and frequency domain analysis methods for discrete time signals and systems, and to develop the fundamentals of Fast Fourier Transforms, digital filter design, multi-rate signal processing, linear prediction and power spectral estimation. Recent advances in compressive sensing will also be introduced.

ATTENDANCE POLICY:  
Students are expected to attend classes regularly.

DROP POLICY:  
As per University guidelines. See the University webpage for drop dates.

HOMEWORK, MATLAB ASSIGNMENTS AND QUIZZES: Homework assignments will be given (almost) regularly, and they are due at the beginning of the class for hardcopy submissions and at the midnight of the due date for online submissions. Late submissions will not be accepted.

PROJECTS:  
Two projects will be assigned for ECE 782/882 students. One term paper project will be given to ECE 882 students. No late assignments will be accepted except under extreme non-academic circumstances.

SOFTWARE REQUIREMENT:  
MATLAB is available on most department laboratory machines. However, other equivalent software can be used or the student can develop his/her own software.

HONOR CODE:  
Students are expected to follow the ODU Honor Code for all assignments and exams. Any violations will be dealt with strictly according to university policy. However, this is also a course, which requires a lot of interaction, and sharing of ideas is encouraged. You are encouraged to discuss assignments with others. Even though discussion is encouraged, the work that you turn in must be your own. If at any time you have a question about whether you are violating the Honor Code, please ask me to make sure.
EXAMS:
Final project: TBA

GRADING POLICY:

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<th>ECE 782</th>
<th>ECE 882</th>
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<td>Homework</td>
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<td>Midterm</td>
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<td>Term Paper</td>
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*If you require an accommodation based on disability, I would like to meet with you in the privacy of my office, during the first week of the semester, to make sure you are properly accommodated.*

STUDENT EVALUATION OF TEACHING:
Students will be asked to complete instructor/course evaluation forms (online) at the end of the semester.

DISABILITIES:
Students who have documented disabilities in accordance with university guidelines will be provided appropriate opportunities if the documentation is brought to the instructor's attention. As a faculty member, I am required by law to provide reasonable accommodation to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

ACADEMIC DISHONESTY:
It is the philosophy of ODU that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. ANY CHEATING WILL RESULT IN SEVERE PENALTIES.

COURSE MATERIAL WILL BE COVERED:

**Module 1**: Review of Time Domain and Frequency Domain Analysis of Discrete-Time Signals and Systems: Linear Convolution, Fourier Transform, Z-Transform, Discrete Fourier Transform (DFT), Linear Filtering Using DFT, Filtering of Long Data Sequences, Sampling theory


**Module 3**: Implementation of Discrete-Time Systems: Structures for FIR and IIR Systems, Direct-Form Structures, Transposed Structures, Cascade-Form Structures, Parallel-Form Structures, Lattice and Lattice Ladder Structures


Module 7: Power Spectrum Estimation: Nonparametric Methods, Parametric Methods

Module 8: Compressive Sensing, L₁ Norm based Optimization, Single Pixel Camera