ECE 535 – Digital Signal Processing
Department of Electrical and Computer Engineering
George Mason University
Fall 2009

Class Meeting Information
Day and Time:  Wednesday, 7:20-10:00 pm
Location: Science and Technology I, Room 126

Instructor Information
Instructor: Dr. Jill K. Nelson
Office: Engineering Building, Room 3216
Phone: 703-993-1598
Email Address: jnelson@gmu.edu
Office Hours: TBA

Course Website
http://gmu.blackboard.com

The course website is located within Blackboard. You can log into Blackboard using the same login name and password you use to log into your GMU email account. You will need to be registered for the course in order to access the course website.

Reading assignments, problem sets, projects, solutions, announcements, and any miscellaneous handouts will be posted on the website. Please check it frequently for updates.

Required Textbook
• Oppenheim and Schafer with Buck, Discrete-Time Signal Processing, 2nd Ed.

Prerequisites
• ECE 410 – Principles of Discrete-Time Signal Processing
• Concurrent or previous enrollment in ECE 528 – Introduction to Random Processes

Course Topics
• Transform Analysis of Discrete-Time Systems
• Discrete-Time Processing of Continuous-Time Signals
• Digital Filter Structures and Quantization Effects
• Digital Filter Design
• Multirate Processing
• Spectral Analysis Using the DFT
• The Fast Fourier Transform

Class Attendance
There is no explicit attendance requirement for this course. However, it is expected that you will attend class meetings. It is strongly recommended that you do the assigned reading before coming to class. If you are absent, you are responsible for the material covered during the class and for obtaining notes from another student. Additionally, you are responsible for turning in any assignments due at the beginning of the class period.
DSP Basics Quiz
A quiz will be given during the second class session. The purpose of this quiz is to evaluate your understanding of the DSP basics that form the foundation for the course.

Problem Sets
Approximately ten problem sets will be assigned during the course. Problem sets are due at the beginning of the class period on the due date. No late problem sets will be accepted. Solutions will be posted on the course website.

Problem sets should be written neatly. Pages should be stapled, and problems should appear in order. I reserve the right to return problem sets ungraded if they don’t meet these requirements.

You are encouraged to work in groups and discuss the assigned problems. However, the work you turn in must be your own. Copying or other forms of cheating will not be tolerated. Do not refer to existing solutions, including those found on the internet or from previous offerings of the course. Copying existing solutions will be treated as a violation of the honor code.

Matlab Projects
Three Matlab projects will be assigned during the course. Projects are due at the beginning of the class period on the due date. No late projects will be accepted without prior permission of the instructor. The projects may require use of the Signal Processing Toolbox for Matlab, which is available on the PCs in the ECE and IT&E labs.

Projects should be organized and professional. All plots must be fully labeled. Work that is disorganized or unreadable cannot be graded. As with problem sets, discussion of Matlab projects is encouraged, but the work you turn in must be your own. Copying or other forms of cheating will not be tolerated.

Exams
The course will include two mid-term exams (given during the class period) and one final exam. The dates for these exams are as follows:
Mid-term Exam 1: October 7, in class
Mid-term Exam 2: November 18, in class
Final Exam: December 16, 7:30-10:15 pm

Each of the mid-term exams will focus on the material that has been covered since the previous exam. However, much of the material in the course builds on the material that is covered before it. Hence, even though the in-class exams are not explicitly cumulative, they will require an understanding of the basic material on which the tested material builds. The final exam will be cumulative, explicitly evaluating your understanding of all material covered in this course.

All exams will be closed book and closed notes unless otherwise stated by the instructor. Absolutely no collaboration is allowed on exams.

Grade Changes
A request for a grade change for any assignment must be provided to the instructor within two class periods (e.g. two weeks) after the assignment is returned. The request must include the graded assignment in question and a statement describing why a grade change is requested.

Honor Code
All students are expected to abide by the George Mason University Honor Code. Any reasonable suspicion of an honor code violation will be reported.
**Grading**
Your final score will be based on a weighted combination of your quiz, problem set, project, and exam grades as follows:

- DSP Basics Quiz: 5%
- Problem Sets: 10%
- Matlab Projects: 20%
- Mid-term 1: 20%
- Mid-term 2: 20%
- Final Exam: 25%

**Tentative Weekly Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>September 2</td>
<td>Review of DSP Basics</td>
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<tr>
<td>September 9</td>
<td>DSP Basics Quiz, Sampling and Multirate Processing</td>
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<tr>
<td>September 16</td>
<td>Polyphase Decomposition, Oversampling A/D and D/A, Quantization</td>
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<td>September 23</td>
<td>Quantization Effects and Noise Shaping, Magnitude and Phase Response</td>
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<td>September 30</td>
<td>Frequency Response: Group Delay, All-Pass and Minimum Phase Systems</td>
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<tr>
<td>October 7</td>
<td>Midterm Exam 1</td>
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<td>October 14</td>
<td>Generalized Linear Phase, FIR Filter Design</td>
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<td>October 21</td>
<td>FIR Filter Design, Parks-McClellan Algorithm</td>
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<td>October 28</td>
<td>Parks-McClellan Algorithm, IIR Filter Design</td>
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<td>November 4</td>
<td>Discrete Fourier Transform</td>
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<td>November 11</td>
<td>Discrete-Time Filter Implementations</td>
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<td>November 18</td>
<td>Midterm Exam 2</td>
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<tr>
<td>November 25</td>
<td>No Class – Thanksgiving Break</td>
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<tr>
<td>December 2</td>
<td>Fast Fourier Transform</td>
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<td>December 9</td>
<td>Spectral Estimation, Time-Dependent Fourier Transform, Adaptive Filtering</td>
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