George Mason University
Electrical and Computer Engineering Department
ECE 410: INTRODUCTION TO SIGNAL PROCESSING
Information Sheet
Fall 2005

Instructor: Dr. Kathleen Wage
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Class: Tues./Thurs. 1:30-2:45pm
Sci & Tech II, Room 15

Office hours: Tues./Thurs. 11:30am-12:30pm
Tues./Thurs. 3:00-3:30pm
Monday 4-5pm
other times by appointment

Prerequisites: ECE 320 and STAT 346 or permission of instructor

Required Texts: *Discrete-Time Signal Processing, Second Edition* by A.V. Oppenheim and R.W. Schafer with J.R. Buck (Prentice Hall, 1999)

Computer Explorations in Signals and Systems Using Matlab, Second Edition by J. Buck, M. Daniel, and A. Singer (Prentice Hall, 2002)

Course Webpage: `http://ece.gmu.edu/~kwage/ece410/fall05`

Brief Description

ECE 410 introduces the fundamental concepts of digital signal processing. Specifically, this course emphasizes the theoretical and numerical tools used for frequency domain analysis of sampled signals. Topics covered include sampling, the discrete Fourier transform, fast Fourier transform algorithms, spectral analysis, and digital filtering.

The workload for this course consists of the following: two class meetings per week, regular homework assignments (see syllabus), five computer-based projects, two in-class examinations, and a comprehensive final examination. Class time is divided between short lecture segments on key concepts and in-class group exercises. Students are expected to do the assigned reading prior to coming to class so that they are adequately prepared to participate in the interactive problem-solving sessions.

Prerequisites

The prerequisites for this course are ECE 320 and STAT 346, and a familiarity with Matlab. If your Matlab background is lacking, you will need to work through the online tutorials provided by the Mathworks. Most importantly, I will assume that you have an interest in and a commitment to developing a deep understanding digital signal processing concepts.

Class Meetings

Class will meet Tuesdays and Thursdays in Science & Tech II, Room 15 from 1:30pm to 2:45pm. It is assumed that you will attend all of the classes, though attendance will not be formally recorded. If missing a class is absolutely unavoidable, you should inform me in advance (if possible) and check with your classmates to obtain the notes for that day. Also, you should check the website to obtain any handouts.

You are required to do the reading assigned on the syllabus before you arrive at each class. As you progress in your career as an engineer, it is essential that you acquire the skill of reading a book to learn necessary information about a technical problem. In your professional life, you will have to solve many problems that were not taught in classes here, and engineering textbooks or journals will be your only

resource. This course will provide an opportunity for you to develop your technical reading skills. Each class will begin with a five-minute Readiness Assessment Test (RAT) to provide additional motivation for you to do the assigned reading. Your grade on these RATs will be 10% of your final grade for the class.

Class meetings will combine short lectures on key points in the material with collaborative problem solving sessions. I feel that the time spent on the problems is much more educational than watching me lecture for the entire period. The work you do in these group sessions will be evaluated in several ways, and be included in your RAT grade for the course. The shortened lecture puts a responsibility on you to be prepared for class by completing the reading the night before. In my experience, students who come prepared to this type of class find that they understand more about the material and homework problems than if they had attended a traditional lecture. Students who are not prepared are more lost and confused than they are in traditional classes. Homeworks and exams may include topics that are in the reading but not covered in lecture, so again, it is important to keep up with the reading to do well in the course.

Homework

There will be regular homework assignments (problem sets). These will be distributed via the course website (`http://ece.gmu.edu/~kwage/ece410/fall05`). You are expected to do ALL the assigned problems. All problems on all assignments will be graded. In making up the exams and in assigning a final grade, I will assume that you have worked ALL the problems. Most exams will include one problem very similar to one of the homework problems. Thus, there will be a very immediate benefit to doing the homework completely and diligently.

Each homework will also include the reading to prepare for the following week's classes. Again, you are required to do this reading before the class meets.

Homeworks must be handed in by the end of the class in which they are due. Solutions will be available from the website on the day that the homework is due. Consequently, it is difficult and unfair to evaluate late problem sets seriously.

Matlab Projects

There will be five projects to be done in MATLAB. The first two projects are individual projects and the last three projects will be done in groups. You are expected to do ALL the projects, and they will be thoroughly evaluated. A considerable effort has gone into designing projects that are interesting, educational, error-free, and an efficient use of your time. Like problem sets, projects must be handed in by the end of the class in which they are due, and solutions will be available on the website. The remarks above regarding late problem sets apply to the projects as well.

Exams

There will be two in-class exams during the semester and one final exam during exam week. The exam dates are listed below.

Exam 1:	Thursday, October 6	1:30-2:45pm
Exam 2:	Tuesday, November 10	1:30-2:45pm
Final Exam:	Thursday, December 15	1:30-4:15pm

These exams will be given in the usual classroom at the times given. As noted above, it is likely that most of the exams will include a problem which is very similar to one of the problem set problems. All of the exams are closed book.

In grading the exams, I will seek to evaluate your understanding of the concepts involved in the problem, not merely your facility at producing the correct answer. It is possible to obtain the correct answer accidently through a chain of errors that reveal a poor understanding of the material. Similarly, an algebraic error in the last step of a problem may cause you to report an incorrect answer from an otherwise flawless train of logic. The grade I assign reflects my best judgment of your understanding of the concepts as evidenced by what you have written.

Course Grade

The final grade in the course is based on my best assessment of your understanding of the material and participation during the semester. The exams, problem sets, and project are combined with the following rough weighting to give a preliminary final grade:

Exam 1	15 %
Exam 2	15 %
Final Exam	20 %
Matlab Projects	30 %
Homework	10 %
RATs & Class Problems	10 %

A student requesting a grade change for any assignment must provide the instructor with the following within *2 class periods* after the work is returned: the assignment and a paragraph describing why you feel you should receive additional points for the work. Note that in some cases, it is possible that what you wrote for the assignment indicated a better understanding of the problem than you actually possess. If the paragraph you submit indicates that you don't understand the problem as well as the grader thought you did, then your score *may be reduced.*

Academic Integrity

All students are expected to abide by the George Mason University Honor Code and the rules outlined below. Any reasonable suspicion of an honor code violation will be reported.

One important goal of this class is to help you learn to work collaboratively in a group. You will be working as a group during all the in-class interactive problem-solving sessions. You are also encouraged to collaborate on the homework assignments. Talking to other students, explaining your ideas and questioning their ideas, is a great way to learn. However, you must write up your own solution for the homework problems. In doing this, you **MUST** identify at the top of the assignment any students you collaborated with to complete the assignment. In signing your own name to the assignment, you are certifying that the work reflects your own understanding of the problems. Simply copying someone else's answer is not working collaboratively, and is not permitted.

The same rules that apply to homeworks also apply to the Matlab projects. Sharing of ideas on the projects is permitted, but copying code is explicitly forbidden. For the first two projects, you must write your own Matlab functions, produce your own plots, and write your own report. The last three projects will be group projects. Sharing of ideas between groups is permitted, but each group must write its own Matlab functions and produce its own report.

The examinations are strictly your own effort, and I will be looking for consistency between the homework performance and the exam performance on those exam problems closely related to the problem sets.