EE432: Digital Signal Processing Course Policy Statement

Fall 2009 – Section 5511
Associate Professor Robert W. Ives

I. Introduction. Digital signal processing principles are studied and applied to modern radar, sonar, and communication systems. The DFT is introduced, its properties are explored and the FFT algorithm is developed. Discrete correlation, convolution, spectral analysis, matched filter detection problems, complex demodulation techniques, the Z transform, and stability of discrete systems are explored. Properties of FIR and IIR digital filters are studied. Digital filters are designed and applied to random and deterministic signals.

II. Course Background Info

A. Textbooks
A Digital Signal Processing Primer by Steiglitz
Digital Signal Processing using MATLAB by Etter & Ives (Draft Textbook)
This textbook is in the creation process. You will be provided with course notes which are drafts of the various chapters of the text. If you find errors in the notes, please let me know.
Introduction to MATLAB 7 by Etter et al

B. Meeting Locations
MWF 5, Tu 5-6 (Ri057). On occasion, some class periods may be devoted to project time. See the online syllabus for the schedule of topics and assignments.

C. Contact Info:

Assoc. Prof. Robert W. Ives
Office: Maury 334
Phone: 3-6165
Email: ives@usna.edu

D. Course Website: http://www.usna.edu/EE/ee432/

III. Grades. Your grade for each grading period will be made up of:

Graded Work/Item	6-Weeks	12-Weeks	Final
Exam 1	50 %	25 %	25 %
Exam 2		25 %	25 %
Homework	15 %	15 %	10 %
Quizzes	15 %	15 %	10 %
Projects	20 %	20 %	20 %
Final Project/Presentation			10 %

As a reminder, ***I reserve the right to adjust your final grade based upon your overall performance.*** Your level of effort, including participation in class and completion of assigned work on time, counts!

IV. Homework (Problem Sets). Homework will be assigned most weeks. You will usually get a week to do most homeworks, but this varies. When assigned, they typically will cover questions that have not already been discussed in class, but will be discussed in class before the due date. If turned in late (later than the due date), they are subject to a late penalty of -20%.

V. Quizzes. There will be quizzes scheduled during the semester, usually one per week. Quizzes are intended to test your general knowledge of the topics covered throughout the course. They are closed book quizzes.

VI. Exams. Two exams will be given during lab periods, or possibly as take-home exams. They will typically include some type of problem(s) that you must solve using MATLAB or any other resource, along with some

question/answer-type of problems. The exams must be done individually and completed in the required time period; if late, your score will be penalized. The exams are open book, open notes, open computer.

VII. Projects. There will be projects assigned. In some cases, these may be group projects, but may also be individual. These projects will primarily be done using MATLAB. Some of these MATLAB projects are to be written up using the format included on the last page of this document, and turned in by the due dates…I'll let you know which ones. Assignments that are turned in late will suffer a significantly reduced grade. Make sure that when submitting MATLAB code, you must document what you're doing and why (with comments)…readability counts. Lack of sufficient comments reduces the grade. An example of a well-written MATLAB function is provided on the last page of this handout.

VIII. Final Project. There will be a final project/presentation in lieu of a final exam, this project will count for 10% of your final grade average, and will involve a presentation to the class on your results. More details will be forthcoming.

IX. Guest Speakers. We may have one or more guest speakers during the semester; they are not finalized, so they are not reflected in the syllabus yet.

X. Excusals. Let me know early if you will miss an exam or quiz. If you miss either, you may have to make it up. If you know you're going to miss a class, turn in any projects due that day early, or have a classmate turn it in for you.

XI. Computers. There are no restrictions on the use students may make of computers in class except:

- The computers in the classroom are for official use only! Do not change their setting or configuration without permission. Do not install a program on a class computer without permission.
- You may not use computers during class for any purpose not directly connected to the subject matter of the course.
- You may not get assistance from anyone during quizzes, tests, or exams, so the use of communications program such as Internet Messenger or file-sharing software to do so is expressly forbidden.

Backup your work and do not assume that files stored on a lab computer's hard drive will not be erased or corrupted by others. **Additionally, the hard drives within the computers will be reformatted about once per month.**

XII. Extra Instruction. Email, drop by, or call to ask for help. My schedule is as follows:

	Monday	Tuesday	Wednesday	Thursday	Friday
1	EE 322 (Ri 061)	EE 322 Lab (Ri 061)	EE 322 (Ri 061)	Research	EE 322 (Ri 061)
2					
3					
4					
Lunch					
5	EE 432 (Ri 057)	EE 432 Lab (Ri 057)	EE 432 (Ri 057)		EE 432 (Ri 057)
6					

XII. Section Leader. On the first day of class, I will appoint a section leader and assistant leader in the event the section leader is not present. They will perform the normal expected functions of a section leader.

XIII. Misc. Check your email at least once a day. We will use email extensively to communicate with each other, including corrections to assignments or schedules.

Good Luck! R.W. Ives, ‘82

Project/Lab Report Format

EE432: Digital Signal Processing
Project #:
Project Title:
Midshipman Name(s):

I. Purpose

What was the purpose of the lab?

II. Procedure/Algorithm

Describe the procedure followed. Also, when writing code, there could be many ways to approach how to accomplish things. Describe how you decided to approach the problem and why. If you tried several ways to do things before something finally worked, describe the problems encountered here.

III. Results & Conclusions

Discuss and include the results you obtained and any conclusions you reached. If your results include any plots, remember the things a good plot should include: title, label on the x-axis, label on the y-axis, and a legend. Images submitted should have a title, and typically don't have any axes.

IV. Code

Submit your MATLAB code, if applicable, including functions and programs. This helps the professor track down any incorrect results you reached. You should have a lot of comments in your code to describe how things worked.

V. Acknowledgements

If you received help in completing the project, give credit to who helped and how they helped you.

VI. Feedback (Optional)

If you have some suggestions about how to improve this lab, or other ideas, put them here. Good feedback is a form of class participation.

A "Well-Written" MATLAB function

When you write a MATLAB function or program, there are a few items that should be included. The following is an example of a well-written function. It contains comments right after the "function" line that tell the user how to use the function. Since this code is stored in a file called "sinc322.m", if a user typed "help sinc322" at the MATLAB command line, these comments would appear. These comments should also list the author(s). In addition, some comments are placed after certain lines of code to help explain what that line does. Use this as a guide to writing your own code.

```
function z=sinc322(x)
% function z=sinc322(x)
%   This function returns the sinc function. Based on MATLAB's sinc.m.
%   For EE322 students.
%   Author: R.W. Ives, USNA
%   Date: 20 Sep 2004

z=ones(size(x)); % set all OUTputs = 1…this will make sinc(0)=1
i=find(x);       % find all INputs not equal to 0
z(i)=sin(pi*x(i))./(pi*x(i));
            % this last will make sinc(x)=sin(pi*x)/(pi*x) for all values
            %     of the input except x=0, which is already set to 1
```