EC380 - Discrete Time and Continuous Systems General Information

This course covers the following:

`System properties: linearity and time-invariance. Sampling and reconstruction. Convolution in discrete-time systems. Z-transform, FIR and IIR filters. Discrete-time filter design. Discrete Fourier transform.`

The **goals** of the course are:

1. Students should develop an awareness of commercial applications of the principles and techniques they are learning.
2. Students should develop the ability to analyze discrete-time systems.
3. Students should develop a discrete-time systems vocabulary adequate for further formal or self-directed study.
4. Students should develop an interest in continuing their study of discrete-time systems.
5. Students should continue to practice and develop problem-solving skills acquired in the prerequisite courses.
6. Students should continue to develop skill in applying frequency domain and transform techniques.
7. Students should continue to hone computer skills (e.g. MATLAB and Maple) for problem solving and report preparation.
8. Students should develop the appropriate skills to be fully prepared for later required and elective courses.
9. Students should develop the ability to communicate technical findings in a clear, precise and persuasive way.
10. Students should develop problem-solving skills in discrete-time and continuous systems.

The **objectives** are:

After successfully completing this course the student should be able to:

1. Relate the topics of this course to applications in industry by describing uses of the techniques and methods in existing applications.
2. Demonstrate an understanding of MATLAB.
3. Submit written homework and special problem assignments that are clear, concise, and informative, and conform to standard writing guidelines.
4. Demonstrate an understanding of system properties and system characterization.
5. Demonstrate an understanding of discrete-time systems in theory and practice.
6. Demonstrate an understanding of finite impulse response (FIR) digital filters and the Z transform.
7. Demonstrate an understanding of discrete convolution.
8. Demonstrate an understanding of infinite impulse response (IIR) digital filters.
9. Demonstrate an understanding of the various forms of the Fourier transform for continuous and discrete signals including the Fourier transform (FT), the discrete time Fourier transform (DTFT), and the discrete Fourier transform (DFT).

What is Expected of You

First and foremost, professional work is the norm in this course. All of your written work and your conduct in class are to be at the level of one who is studying a profession – the profession of engineering. This means a number of things:

- Your work is neatly done in a professional manner, using formats specified.
- Your work is honestly done, individually where required, with credit given to the work of others when done in groups.
- Your work is done on time.

The Syllabus lists three different kinds of work that you are expected to perform, reading, homework, and Mini Projects. All are important in the course, because all of these work together to help you get a firm grasp of the material. Here is what you can expect:

- Reading assignments are to be completed *before* the class for a given day. Try to understand as much as you can, and be prepared to ask questions in lecture if something isn't clear.
- Problems are assigned weekly. These are to be done in the format specified. They are always due at the beginning of class on the Monday following the day on which they are

assigned (except when an exam intervenes). Late work may not be graded.
- Mini Projects all small MATLAB projects that show how DSP solves real problems.

Grading Policy

Your final grade has a number of components and will be weighted by the following means:

Homework	15
Mini Projects	15
Hour Exams	40
Final Exam	30
	100

Homework enables me to identify weaknesses *before* the exam. Your name should appear at the top of each page. Each problem should list the **given** information, the answer to **find**, and your **solution**. In most cases, understanding the concepts is more important than the right answer, however unless you explain your approach it may be difficult to assess your understanding. See **http://www.rose-hulman.edu/Class/ee/yoder/ece380/Handouts/Homework%20Format.pdf** for more details.

Class Web Site

The class web site isn't fancy, but it has important information for the class. All handouts will be posted here, including homework. Please take a look at:

http://www.rose-hulman.edu/Class/ee/yoder/ece380

Missing and Late Work

You are welcome to miss as much work as you wish or to turn in as much as you wish as late as you choose. The penalties for making these choices are fairly severe, however.

Missed exams cannot be made up.

Missed or late homework may not be graded.

It is much to your advantage to be present and to be on time with your work.

Unclaimed Homework and Handouts

Any unclaimed homework or handouts will be placed in the ece380 bin outside my office (C209).

Closing Remarks

Digital signal processing is a very hot area now. More and more things are being done digitally creating more need for those who understand how digital works. This is a fun class that will introduce to you a world of opportunities in the area of digital signal processing.

Mark A. Yoder