

# ECEn380 – Spring Term, 2009

## Schedule:

**Lectures** MTThF at 12:00-1:50 in 393 CB

**Recitation** WF at 9:00–9:50 in 490 CB

**Laboratory instruction** TTh at 2:00–4:50 in 490 CB

**Instructor:** Wynn Stirling, 442 CB, Phone: 801-422-7669; e-mail: wynn@ee.byu.edu. Office hours: MTThF, 10:30–11:30 and by appointment.

**TA:** The TA for this course is Yabing Luo.

**Text:** *Signals and Systems*, by Oppenheim and Wilsky, 2nd Ed. and *Computer Explorations in Signals and Systems using Matlab*, by Buck, Daniel, and Singer.

## Lectures

Semi-week	Date	Topics	Reading
1	4/28	Introduction, background, examples, continuous-discrete linear systems and properties.	(pp 1–56,75–77)
2	4/30–5/1	Linear time invariant systems, convolution (continuous and discrete).	(pp 78–102)
3	5/4–5/5	Properties of linear time invariant systems, stability, modeling of continuous-time systems.	(pp 103–127)
4	5/7–5/8	Modeling of discrete-time systems, block diagrams	(pp 127–137)
5	5/11–5/12	Introduction to continuous-time Fourier series.	(pp 177–201)
6	5/14–5/15	Introduction to continuous-time Fourier transform.	(pp 202–239)
7	5/18–5/19	Properties of the Fourier transform.	(pp 240–250, 284–314)
8	5/21–5/22	Introduction to discrete-time Fourier series, the discrete-time Fourier transform, the discrete Fourier transform.	(pp 314–335)
9	5/26	Properties of the discrete-time Fourier transform.	(pp 358–382)
10	5/28–5/29	The sampling theorem, signal sampling, aliasing, continuous-discrete conversion.	(pp 514–534,654–662)
11	6/1–6/2	Introduction to the Laplace transform.	(pp 663–673)
12	6/4–6/5	Inverse Laplace transform, properties, analysis.	(pp 674–720)
13	6/8–6/9	Introduction to the z-transform and the inverse z-transform, geometric properties.	(pp 741–774)
14	6/11–6/12	Properties of the z-transform, analysis.	(pp 674–797)
15	6/15	Summary and Review	

# Homework

ECEn 380 is a rigorous course, and a student cannot seriously expect to do well without attending class regularly and working all of the assigned homework. Homework will normally be accepted on or before the due date only. Late homework will not be graded. Assignments will be due by 4:30pm each Monday and Thursday. Please put your assignment in the appropriate slot in the homework box in the hall. Your homework scores will not adversely affect your grade, but will be used to evaluate borderline cases to the extent that a strong homework performance can raise your grade by one graduation on the grading scale (e.g., from a  $B+$  to an  $A-$  or from an  $A-$  to an  $A$ ).

You are encouraged to work together, if you wish, on the homework. I view this aspect of the course as an interactive student learning experience (that is why the homework does not figure directly into your grade except for your benefit), and hope you take full advantage of your colleagues to both learn and explain the concepts that are developed through the assigned homework.

It may appear that it is possible to finesse the homework, since it figures in your grade in a peculiar way. This is intentional. I would rather have you allocate your time and effort to gain understanding rather than to collect points. I assume that you have developed your own mature study habits—if not, you will need to acquire these skills now to pace yourself in this class. A strong performance on all exams will guarantee you a good grade, but I seriously doubt that many students will achieve success on the exams without working the homework. (Please be aware, however, that the exam problems will not be warmed-over homework problems!)

Semi-week	Date	Problems	Due date
1	5/2	1.21, 1.27, 1.30, 1.31, 1.34, 1.38	5/4
2	5/4–5/5	2.21, 2.22, 2.27, 2.40, 2.43	5/7
3	5/8–5/9	2.30, 2.32, 2.33, 2.45, 2.48	5/11
4	5/11–5/12	3.21, 3.24, 3.26, 3.40, 3.42	5/14
5	5/15–5/16	3.46, 3.49, 3.52, 3.54, 3.55, 3.58	5/18
6	5/18–5/19	Midterm 1	
7	5/22–5/23	4.21abc, 4.22abc, 4.23, 4.26, 4.29, 4.31	5/25
8	5/25–5/26	4.38, 4.41, 4.45	5/28
9	5/30	5.24, 5.26, 5.29, 5.30, 5.42	6/1
10	6/1–6/2	7.22, 7.23, 7.26, 7.28, 7.29	6/4
11	6/5–6/6	Midterm 2	
12	6/8–6/9	Midterm 2	
13	6/12–6/13	9.21, 9.22, 9.23, 9.25, 9.27, 9.28	6/11
14	6/15–6/16	10.21, 10.25, 10.26, 10.33, 10.34, 10.37	6/15

# Recitations

A recitation class will be held MW 9:00–9:50, in 490 CB. This class will be conducted by the TA, and will provide you with additional assistance as you gain understanding of the

material. Attendance is optional, as no new material will be introduced. This is *not* intended to be simply a homework help session. You should do your homework on your own (that's why it is called homework), but the recitation TA will help you understand the principles and techniques that will enable you to do your homework. Please do not ask the TA or me to “move your elbow.” You cannot learn this material by simply watching others do it. You must experience the thrill of discovery and the agony of frustration yourself if you are to claim ownership of the knowledge.

## Laboratories

The lab class will be held TTh 2:00–4:50, in 490 CB. The assignments will be completed using MATLAB, which is available on the PCs in the analog lab and in the large CADEM lab (425 CB). The laboratory assignments and due dates will be provided by the TA.

## Grading Policy

*Exams:* There will be two midterms (15–19 May and 5–9 June) and a final examination in the testing center during finals week. Each midterm will be worth 100 points, the lab will be worth 100 points, and the final will be worth 200 points.

## Prerequisites

Math 334, ECEn212 and admission to the program are required.

## Goals Of The Course

The main goal of this course is to develop the classical signals and systems analysis theory for the both continuous- and discrete-time cases. These principles form the base of a very mature, rich sub-discipline of electrical engineering that that has many extensions and special nuances, many of which can be pursued in further (usually graduate) study.

This course is mainly a “theory” course rather than an “applied” course. It focuses on the development of analysis techniques, which define a body of knowledge that has a variety of potential specific applications. The examples that are given will be motivated by their pedagogical value rather than their practical use. we may set

## Comments

Here are a few miscellaneous comments.

1. I expect that you will have read the assigned material before I lecture on it. Be aware, however, that although the material in the text is complete and self-contained, I will not confine my lectures to that source of material. Rather, the lectures will be based also upon my own experience and pedagogical style.

2. We will move at a rather fast, but uniform, pace in this class. I assume that you are all mature, motivated students, and will look after your own best interests. If you are unclear on the subject matter, or are falling behind for any reason, I expect you to talk to me before it becomes a serious problem.
3. I sincerely welcome you to talk with me about the class material. The best time is during regular office hours. If this time is inconvenient for you, we can schedule a time that works for both of us.
4. One more thing regarding office visits and homework. Please do not ask me to work through the details of homework problems. Some students in the past have taken my reluctance to give them direct answers as evidence that I am not interested in their progress. Nothing could be further from the truth. I simply believe that the students' struggles with their understanding is much more important than simply getting an answer. That is why I do not reduce your grade because of your homework performance, and why I encourage you to work together.
5. I assume that you are all committed to the honor code, and will attempt to follow the "spirit of the law" as well as the letter. If any of you prove otherwise, I will be greatly disappointed, since you are all advanced, mature students. I hope that we never need to discuss or deal with honor code violations in this class.

## **Disabilities**

If you have any disabilities that may affect your performance, please notify me and the TA's at the beginning of the term so your course work can be coordinated with the Disabled Student Support Office