EE3015: Signals & Systems, Spring 2020

Course Description

Basic techniques for analysis/design of signal processing, communications, and control systems. Time/frequency models, Fourier-domain representations, modulation. Discrete-time/digital signal/system analysis. Z transform. State models, stability, feedback.
Prereq: [EE 2011, CSE Upper Division] or dept consent

Instructor

A. B (Bob) Mahmoodi
Office: Keller Hall 2-115
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Office Hours: M W F 9:00-10:00 am

Lecture

M W F 10:10 – 11: 05 am Keller Hall 3-125

Discussion Sections

Wednesdays	Sec. 002: A. B. Mahmoodi	12:20 – 1:10 pm	Vincent Hall 213
Wednesdays	Sec. 003: A. B. Mahmoodi	1:25 – 2:15 pm	Akerman Hall 215

All discussion sections will start on January 29th.

Teaching Assistants

Omer Burak Demirel
Email: demir035@umn.edu
Office Hours: Thursday Friday 9:00-10am (Keller Hall 2-276)

Jack Erhardt
Email: erhar057@umn.edu
Office Hours: M Tues 12:00-1:00pm (Keller Hall 2-276)

Text Book

Signals & Systems 2nd ed. Oppenheim & Willsky & Nawab

Computer Software

MATLAB Student version, latest version (this software is available to all CSE students)

Topics covered

Chapter 1 (1/22, 1/24)

Introduction (Sections 1.1-1.7); Continuous and discrete-time signals; Operations on signals; Properties of signals; Elementary signals, Continuous- and discrete-time systems; Interconnections of systems; System Properties; Intro to Convolution

Chapter 2 (1/27 thru 1/31)

Time Domain Representations for Linear Time Invariant Systems (Sections 2.1-2.5); Convolution; Properties of convolution; Difference and differential equations (characterizing solutions, block diagrams & interconnections)

Chapter 3 & 4 (2/3 thru 2/21)

Fourier Representations of Signals (Sections 3.1-3.11); continuous time Fourier series & transform and properties (sections 4.1 – 4.7)

Midterm 1, Friday Feb 28th, Chapters 1, 2, 3, 4

Chapter 5 & 6 & 7 (2/24 thru 3/27)

Applications of Fourier Representations (discrete time); Frequency response; Fourier transform representation for discrete-time signals (sections 5.1- 5.8); Application to filters (sections (6.1 – 6.7); Sampling continuous-time signals; Reconstruction of continuous-time signals from samples (sections 7.1-7.5)

Chapter 9 (3/30 thru 4/3)

The Laplace Transform, definition and convergence properties (Sections 9.1-9.9); Inversion; Solving Differential Equations; Transform Analysis of Systems.

Midterm 2, Friday April 3rd, Chapters 5, 6, 7

Chapter 10 (4/6 thru 4/17)

Intro to Z transform (sections 10.1-10.9); inverse Z transform properties and existence of the transform; Applications in digital signal processing.

Chapter 8 (4/20 thru 4/24)

Introduction to Communication Systems (sections 8.1-8.9); Modulation application

Chapter 11 (4/27 4/29)

Intro to Feedback System (11.1-11.5) (If time permits, review otherwise. Typically this is covered in detail in your control systems course.

Review (5/1, 5/4) Last day of class is on 5/4.

Final Exam: 1:30 – 3:30 pm Saturday May 9th, Keller Hall 3-125

Homework Assignments

Homework is assigned every week and is due the following week. The grader will grade a random selection of problems out of all assigned. 50% of your homework problems will be graded for correctness of your solution, and the remaining 50% will be graded based on an attempt at a solution (please show your work). No late homework will be accepted, except in emergency situations.

Please scan your homework as a PDF file and submit it via canvas to our TA by the due date. Paper submissions will not be accepted.

Several assigned problems require the use of MATLAB. This software package is available to all CSE students, and on the CSE lab computers.

Grading Policy

Midterm I	25%	2/28, in lecture
Midterm II	25%	4/3, in lecture
Final Exam	35%	5/9, 1:30 – 3:30 pm
Homework	10%	
Discussion Quiz	5%	

Other Important Information

Student Academic Integrity and Scholastic Dishonesty:

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own, can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

Scholastic Dishonesty:

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, scholastic dishonesty includes, but is not limited to, looking at and/or copying from another's exam, using unauthorized note sheets during exams, any unauthorized communication during exams (including verbal and/or electronic communications), etc. A student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. For additional information, refer to the student conduct code available here:
http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf

Disability Accommodations:

The University of Minnesota views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. Additional information is available on the DRC website:
https://diversity.umn.edu/disability/