Fall 2021 - LINEAR SYSTEMS AND SIGNALS (17720)

Lecture: Monday & Wednesday 3:00pm – 4:30pm at EER 1.518
(*Note*: Lectures will be recorded and posted on Canvas)

Instructor: Prof. Aryan Mokhtari, mokhtari@austin.utexas.edu

Office Hours: (online)
Wednesday 5:00pm-6:00pm (Zoom link: https://utexas.zoom.us/j/99139100040)
Thursday 5:00pm-6:00pm (Zoom link: https://utexas.zoom.us/j/97204846206)

TA: Mojtaba Heydari, **heydari@utexas.edu**

Office Hours: (online)
Monday: 12:15 pm to 1:45 pm, (Zoom link: https://utexas.zoom.us/j/98060247519)
Tuesday: 6:00 pm to 7:30 pm, (Zoom link: https://utexas.zoom.us/j/96369569584)

Course Objective:

This course will build a mathematical foundation for analyzing linear signal processing, communication, and control systems.

Prerequisites:

Electrical Engineering 411, 331, or Biomedical Engineering 311 with a grade of at least C-; Mathematics 427K with a grade of at least C-; and credit with a grade of at least C- or registration for Mathematics 340L.

Topical Outline:

Representation of signals and systems; system properties; sampling; Laplace and z-transforms; transfer functions and frequency response; convolution; stability; Fourier transform; feedback; and control applications. Computer analysis using MATLAB.

Required Text:

Signals and Systems, 2nd Edition, by A. V. Oppenheim, A. S. Willsky, with S. H. Nawab

Online Tools:

- *Canvas:* Announcements, class notes, assignments, grades for homework and exams.
- *Gradescope:* Electronic homework submission and homework/exam grading platform.

Homework:

There will be homework due approximately once every week and **will be assigned on Canvas and Gradescope**. **Homework needs to be scanned and submitted via Gradescope before 11:59pm** on the day it is due. Solutions will be released on Canvas after deadline.

Submissions outside of Gradescope, and late submissions, will not be accepted.

** *One homework (the one with lowest score) will be dropped from the final grading*.

** *Discussing homework problems is encouraged. Copying is considered cheating*. Be absolutely certain to submit your own independent homework solutions, e.g., copying or letting someone else copy your homework is unacceptable.

Grading and Exams:

Midterm Exam 1: Monday, October 4, 2021, 3:00 pm - 4:30 pm

Midterm Exam 2: Monday, November 1, 2021, 3:00 pm - 4:30 pm

Final Exam: Wednesday, December 15, 2021, 7:00 pm - 10:00 pm

Weights: Homework: 25%, Midterm 1: 20%, Midterm 2: 20%, Final Exam: 35%

The plus/minus grading system will be used.

Lecture Topics:

- Introduction and review of complex arithmetic
- Classification of signals and systems
- D.T. convolution
- C.T. convolution
- Stability of D.T. and C.T. systems
- Continuous-time (C.T.) differential equations and initial condition problems
- Discrete-time (D.T.) difference equations and initial-condition problems
- Eigen property for linear time-invariant D.T. and C.T. systems
- C.T. Fourier Series
- C.T. Fourier Transform
- Convolution and multiplication properties of the Fourier Transform
- Ideal and practical filters
- Communication systems
- Sampling
- Laplace Transform
- D.T. Fourier Series, D.T. Fourier Transform, and the Z Transform

University Honor Code

"The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community."

College of Engineering Drop/Add Policy

The Dean must approve adding or dropping courses after the fourth class day of the semester.

Students with Disabilities

UT provides upon request appropriate academic accommodations for qualified students with disabilities. Please contact Office of Dean of Students at 471-6259 or ssd@uts.cc.utexas.edu.

Emergency Preparedness

Every member of the university community must take appropriate and deliberate action when an emergency strikes a building, a portion of the campus, or entire campus community. Emergency preparedness means we are all ready to act for our own safety and the safety of others during a crisis. Students requiring assistance in evacuation must inform the instructor in writing of their needs during the first week of class. This information must then be provided to the Fire Prevention Services office by fax (5122322759), with "Attn. Mr. Roosevelt Easley" written in the subject line.

You may want to bookmark the emergency Web site http://www.utexas.edu/emergency/ because it is updated with information during actual emergencies or campus closures.
The university collects cell phone numbers from members of the campus community for emergency text messages. You can sign up for campus text alerts online. If you would like more information regarding emergency preparedness, visit http://www.utexas.edu/safety/preparedness