# **EE w313 Linear Systems and Signals** (Summer 2016) Unique Number 76540

Lecture Hours by Instructor: MWF 1:00 PM -2:30 pm, CPE 2.210

Problem Solving Sessions by TA: Tuesdays 1:00-2:00 PM, ETC 5.148.

# Instructors

Prof. Hazem Hajj: http://www.ece.utexas.edu/people/faculty/hazem-hajj Lectures: June 1st - July 19th. 18 lectures + Midterm 1. Email: hazem.hajj@utexas.edu
Office Hours: Before and after lecture MWF 12:30pm-1:00pm and 2:15-2:45 pm.
Office Hours Location: Just outside of the classroom
Prof. William Bard: http://www.ece.utexas.edu/people/faculty/william-bard Lectures: July 20th - July 29th. 5 lectures.
Email: w.bard@mail.utexas.edu
Office Hours: Before and after lecture MWF 12:30pm-1:00pm and 2:15-2:45 pm.
Office Hours: Before and after lecture MWF 12:30pm-1:00pm and 2:15-2:45 pm.
Office Hours: Location: Just outside of the classroom
Prof. Brian Evans: http://users.ece.utexas.edu/~bevans/
Lectures: August 1st - August 21st. 6 lectures + Midterm 2 + Final Exam.
Email: bevans@ece.utexas.edu
Office Hours: Before and after lecture MWF 12:30pm-1:00pm and 2:15-2:45 pm.

Office Hours Location: Just outside of the classroom

# TA: Ms. Ambika Verma

Email: ambika@utexas.edu

Problem Solving (Videotaped): Tuesdays 1:00-2:00pm (ETC 5.148) Office Hours: Tuesdays 2:00-2:30pm (ETC 5.148) and Thursdays 1:00-2:30 pm in ACA.

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

# **Topic 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.

# Prerequisites

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

# **Required Textbook**

1. B. P. Lathi, *Linear Systems and Signals*, Oxford Univ. Press, 2nd ed., ISBN 019515833-4, July 2004.

# **Optional Textbooks**

1. M. J. Roberts, *Signals and Systems: Analysis of Signals Through Linear Systems*, McGraw-Hill, ISBN 978-0072930443, June 2003.

2. James H. McClellan, Ronald W. Schafer, and Mark A. Yoder, *DSP First: A Multimedia Approach*, Prentice-Hall, ISBN 0-13-243171-8, 1998. <u>On-line Multimedia CD ROM</u>.

# **Grading** 3% Attendance/Participation 17% Homework + In-class evaluations 20% Midterm #1 20% Midterm #2 40% Final Exam (Cumulative, twice as long as a midterm exam)

Each in-class evaluation will count like an assignment. The lowest grade of the combination of (Homework + In-class evaluations) will be dropped.

Midterm #1 (Friday, July 1<sup>st</sup>, 2016) and Midterm #2 (Wednesday, August 3<sup>rd</sup>, 2016) will be held during lecture. The time and location for the final exam is set by the Office of the Registrar to take place on August 15<sup>th</sup>, 7-10pm.

Lecture helps connect the pieces of the class together. Attendance in lecture is highly correlated to your final grade and helpful in landing industry positions. Moreover, it allows you to get the most for your tuition dollar. Plus and minus grades will be assigned for the final letter grades.

Grades on assignments will be posted on the course Canvas site.

Request for regrading an assignment must be made in writing within one (1) week of the graded assignment being made available to students in the class.

Discussion of homework questions is encouraged, but.... Each you need to submit your own independent homework solutions. Late assignments will be subject to a penalty of 2% for every minute late.

### 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, fairness, and respect toward peers and community." http://www.utexas.edu/about-ut/mission-core-purpose-honor-code

# **Religious Holidays**

By UT Austin policy, you must notify the instructor of any pending absence at least fourteen (14) days prior to the date of observance of a religious holy day, or on the first class day if the observance takes place during the first fourteen days of the semester. If you must miss class, lab section, exam, or assignment to observe a religious holiday, you will have an opportunity to complete the missed work within a reasonable amount of time after the absence.

### College of Engineering Drop/Add Policy

The Dean of Engineering must approve adding or dropping courses after the second class day of the summer term.

### Students with Disabilities

UT provides upon request appropriate academic accommodations for qualified students with disabilities. Disabilities range from visual, hearing, and movement impairments to ADHD, psychological disorders (e.g. depression and bipolar disorder), and chronic health conditions (e.g. diabetes and cancer). These also include from temporary disabilities such as broken bones and recovery from surgery. For more information, contact Services for Students with Disabilities at

(512) 471-6259 [voice], (866) 329-3986 [video phone], <u>ssd@uts.cc.utexas.edu</u>, or <u>http://ddce.utexas.edu/disability</u>.

### *Lecture Topics (not necessarily covered in order below)*

- 1. Signals
- 2. Systems
- 3. Continuous-Time Convolution
- 4. Differential Equations
- 5. Discrete-Time Signals and Systems
- 6. Discrete-Time Convolution
- 7. Stability
- 8. Difference Equations
- 9. Fourier Series
- 10. Fourier Analysis
- 11. Fourier Transform Properties
- 12. Sampling Theorem
- 13. Laplace Transforms
- 14. Inverse Laplace Transforms
- 15. Transfer Functions
- 16. System Realization
- 17. Z-transform
- 18. Difference Equations
- 19. Frequency Response