Prerequisites

Electrical Engineering 411 and Mathematics 427K with a grade of at least C in each. Essentially, it is expected that you enter the class understanding the basics of differential equations and Laplace transforms, and how to model RLC circuits.

Course Objectives

This course is meant to prepare you for the remainder of your electrical engineering education. Many fields of engineering can be reduced to creating a series of block diagrams (systems), and analyzing the properties of the signals that move through the system. Although this course will often seem abstract, it consists of many of the fundamental mathematical models engineers use when designing systems, and I will make every effort to show connections and applications as time allows. However, due to the amount of material covered in the class, at times this won’t be possible – please trust me that you will see the connections later in your academic career (especially if you pursue a concentration in systems, communications, signal processing, DSP, circuit design). I bet the first time you saw a derivative in calculus, that seemed pretty useless too!

By the end of this course, you should be able to analyze systems by examining their input and output signals. You should be able to compute a system output in either time or frequency given the system input and a description of the system, using the Laplace, Fourier, or Z-transform, as appropriate. You should understand the differences and similarities between discrete and continuous time signals and systems. This may be the first time you have seen discrete mathematics. The idea is that computers and the digital circuits used in engineering are inherently discrete. You should be able to create discrete signals by sampling continuous signals, and understand the requirements on the sampling. If this paragraph makes no sense to you now, that’s OK, it should after the course!

Topical Outline
This course is the foundation for future study of system engineering, communications, signal processing, and controls. Fundamental concepts in the study of engineering are introduced along with examples of their application:

- Representation of signals and systems
- System properties: transfer functions, frequency response, stability
- Convolution and time domain response of systems
- Laplace transforms (complex transform, continuous time)
- Z-transforms (complex transform, discrete time)
- Fourier series and the Fourier transform (imaginary transform, continuous time)
- Sampling and the Sampling Theorem (how to convert continuous signals to discrete signals, and vice versa)
- AM/FM modulation, digital signal processing, elementary control theory, and other applications.

Required Textbook

Web Resources
The class webpage is accessible at:
http://users.ece.utexas.edu/~jandrews/ee313/

Here, you will be able to find all handouts for the class.

The online class system is called Blackboard. Most handouts will be distributed on the public web page (above), but we’ll send group e-mails and do online grading through Blackboard (so you can view your grades there). Please make sure you know how to access Blackboard and that you are listed there as a student.

Grading
22.5% Exam 1
22.5% Exam 2
15% Homework
35% Final
5% Class Participation and quizzes

Other Information
Homework will typically be assigned Thursday, due the following Thursday by the start of class, either in class or to a drop box outside Prof. Andrews’s office. Students are encouraged to try the homework problems on their own, and then refine their understanding and solution with another student or group of students. You must write the names of all the students you collaborated with
at the top of your homework, and turn in your own version. Simply copying another student’s paper is not acceptable though, even if referenced as such. Copying without referencing will be treated as especially serious. Late homework will be accepted only in the most extraordinary of circumstances (if you aren’t sure that your excuse is extraordinary, then it isn’t). This said, please note that homework is worth only 15% of your grade. As far as grades, your best strategy is probably to treat the homework as a study tool so that you can excel on the exams, which are what will mostly determine your grade.

Short (10 minute) pop quizzes will be given most weeks at the end of the second class. They will not figure heavily in your grade (less than 5%), but will help both you and the professor assess whether you are learning the key concepts presented in lecture. Typically, the quizzes will be worth 10 points and your lowest quiz grade will be dropped when computing the final grades (there are no make-up quizzes).

It is possible that there will be a mini-project where you will design a simple engineering system (in Matlab or Simulink) based on concepts and theories that are central to the class. It will take longer than a normal homework, and be more. Exact details will be given closer to the time of this project, assuming it is given.

Regrade Policy
All requests for regrades, on homework or exam, must be submitted in writing within a week of their return to you. No verbal complaints will be considered. Mistakes can be made in the grading process and we will correct those, but it is unlikely that more partial credit will be given. The basic idea here is that we don’t want to indirectly penalize those students who don’t ask for regrades. Also be aware that the result of a regrade can actually be a lower score as we will regrade the entire problem being protested.

College Drop/Add Policy
An engineering student must have the Dean’s approval to add or drop a course after the fourth class day of the semester.

Students with Disabilities
The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the College of Engineering Director of Students with Disabilities at 471-4382.