Course Syllabus for ELEG 5403 Systems Theory
Spring 2007 Semester, University of Arkansas-Fayetteville
Room: Bell Engineering Center 291, MWF 10:30 AM – 11:20 AM

Instructor: Roy McCann, Ph.D., P.E.
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Office Hours: Wednesday, 1:00 PM – 3:00 PM, or by appointment.

Text Book: Linear System Theory, Wilson Rugh, Second Edition, Prentice-Hall: 0-13-441205-2.

This course is targeted towards graduate students in control systems and digital signal processing, although the material is applicable to most areas of engineering. The purpose is to introduce the design and analysis methods for linear systems, with emphasis on multiple-input and multiple-output systems. In addition, the concept of function spaces as a method to bring geometrical aspects to signal analysis will be presented.

Coursework will consist of the following:

1. There will typically be brief homework assignments given each week on Mondays and due the following Monday. These will normally be taken from the end-of-chapter questions in the textbook. Homework will not be assigned the week prior to a test. There will also be recommended problems that the student should work through ensure proper understanding of the topics.
2. There will be two written tests. The first will be given in-class. The second will be a take-home exam.
3. A Matlab/Simulink based design project is required to be completed. Projects will be selected from a set of options that will provided by the instructor. The Matlab/Simulink modeling will address non-ideal effects associated with microcontroller-based computations such as sample-rate and quantization errors. The class project counts as the final exam.

Notify me at least one week in advance to make alternative plans in the event of schedule conflicts with regard to tests and assignment due dates. 100% class attendance is strongly encouraged in order to be properly prepared for the assignments and tests.

Course Grading Allotment

- Homework Assignments Combined: 30% of Total
- Two Written Tests at 20% Each: 40% of Total
- Design Project: 30% of Total

Grade Assignment Guidelines

This class is targeted towards graduate students in engineering as well as senior undergraduate students with sufficient background in linear algebra and control systems. Accordingly, high quality work is expected. Grades will be based upon an evaluation of each individual student's performance throughout the course. The following are the approximate grade assignments for the course:

      85% to 100% $\rightarrow$ A
      70% to 84% $\rightarrow$ B
      Less than 70% $\rightarrow$ C (if course requirements completed)

Class Topics

Linear systems analysis is used extensively throughout all branches of science and engineering. This course includes the following objectives:

1. Introduce and gain familiarity with mathematical notation and concepts often encountered in graduate research.
2. Obtain advanced skills in numerical methods for solving mathematical problems and simulating dynamic systems. We will use Matlab/Simulink in this course, but the knowledge learned is applicable to other commercially available computer-based solvers and simulators.
3. Understand and apply the concept of function spaces as a geometrical abstraction for analyzing signals.
4. Develop the ability to develop mathematical models of practical systems often encountered in engineering applications. This course will focus on power electronic and energy conversion systems, biomedical and physiological processes, and acoustical systems.
5. Learn and apply the methods of differential equations, linear algebra and Fourier analysis to linear multivariable systems.

Systems Theory ELEG 5403
Spring 2007
Student Survey

Name:

Please indicate if you have preferred alternate email address (besides uark.edu):

1. Do you have a schedule conflict with the office hours of Wednesdays 1:00 – 3:30 PM?

2. Are you familiar with Matlab/Simulink?

3. Please list advanced mathematics courses you have taken (e.g., linear algebra, complex variables…).