SYST 320: Dynamic Systems II

Fall 2007

Course Overview

In engineering, it is important to predict the behavior of systems that change in time. Such systems are called *dynamic systems*. Examples of such systems are the suspension system of a car (a mechanical system), an audio amplifier (an electrical system), and the cash-flow of a large corporation (an economic system). This course teaches students to model a large class of dynamic systems and to solve these systems both analytically and numerically.

The course is a follow-on course to SYST 220, Dynamic Systems I. The first course covered fundamental aspects of obtaining solutions using Laplace transforms and block diagrams. This course continues the analysis of how systems respond to different external inputs and controls. Key questions addressed in this course are:

- Is the system stable?
- What are fundamental characteristics of the system behavior as a function of time?
- How does the system respond to oscillatory inputs?
- How can external controls be applied to ensure adequate system performance in the presence of uncertain disturbances?
- How should the system be designed to meet specified engineering requirements?

Class Hours: Tuesday, Thursday, 1:30 – 2:45 pm.
Location: Thompson Hall, room 116.

Pre-requisites: SYST 220 (Dynamic Systems I)
MATH 203 (Matrix Algebra)
MATH 214 (Differential Equations)
PHYS 260 & 261 (University Physics II)

Instructor: John Shortle
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Office hours: Wed 3 – 5 pm

Textbook: Palm, W. J. 2005. *System Dynamics*. McGraw-Hill.

Student Evaluation Criteria

Homework assignments	17%
Class participation	3%
Group project	10%
Midterm 1	20%
Midterm 2	20%
Final exam	30%

Syllabus and Course Schedule
Last Updated: 8/30/07

Tue. Aug. 28	Introduction & Review of SYST 220	
Thu. Aug. 30	Chap. 6: Electrical Systems	
Tue. Sep. 4	Chap. 6: Electrical Systems	
Thu. Sep. 6	Chap. 6: Electrical Systems	Hmwk #1 due
Tue. Sep. 11	Chap. 6: Electrical Systems	
Thu. Sep. 13	Chap. 6: Electrical Systems	Hmwk #2 due
Tue. Sep. 18	Chap. 6: Electrical Systems	
Thu. Sep. 20	Chap. 8: Time Domain Analysis	Hmwk #3 due
Tue. Sep. 25	Chap. 8: Time Domain Analysis	
Thu. Sep. 27	Chap. 8: Time Domain Analysis	Hmwk #4 due
Tue. Oct. 2	Exam 1: Chap. 6, 8	
Thu. Oct. 4	Chap. 8: Time Domain Analysis	
Tue. Oct. 9	Columbus Day	
Thu. Oct. 11	Chap. 8: Time Domain Analysis	Hmwk #5 due
Tue. Oct. 16	Chap. 9: Frequency Domain Analysis	
Thu. Oct. 18	Chap. 9: Frequency Domain Analysis	Hmwk #6 due
Tue. Oct. 23	Chap. 9: Frequency Domain Analysis	
Thu. Oct. 25	Chap. 9: Frequency Domain Analysis	Hmwk #7 due
Tue. Oct. 30	Chap. 9: Frequency Domain Analysis	
Thu. Nov. 1	Chap. 10: Control Systems	Hmwk #8 due
Tue. Nov. 6	Exam 2: Chap. 8, 9	
Thu. Nov. 8	Chap. 10: Control Systems	
Tue. Nov. 13	Chap. 10: Control Systems	Hmwk #9 due
Thu. Nov. 15	Chap. 10: Control Systems	
Tue. Nov. 20	Chap. 10: Control Systems	Group Projects Due
Thu. Nov. 22	Thanksgiving	
Tue. Nov. 27	Chap. 11: Design of Control Systems	
Thu. Nov. 29	Chap. 11: Design of Control Systems	Hmwk #10 due
Tue. Dec. 4	Chap. 11: Design of Control Systems	
Thu. Dec. 6	Review	Hmwk #11 due
Thu. Dec. 13	Final Exam, 1:30 – 4:15 pm	