SYST 320: Dynamic Systems II

Fall 2009

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 a 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: Monday, Wednesday, 3:00 – 4:15 pm.
Location: Robinson Hall B, room 208.

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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Room: Engineering Building, room 2210
Office hours: See web site for latest hours

Teaching Asst.: TBD

Textbook: Palm, W. J. 2008. *System Dynamics*. McGraw-Hill, 2nd edition.

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: 8/20/09

Mon. Aug. 31	Chap. 6: Electrical Systems	
Wed. Sep. 2	Chap. 6: Electrical Systems	
Mon. Sep. 7	No Class (Labor Day)	
Wed. Sep. 9	Chap. 6: Electrical Systems	Hmwk #1 due
Mon. Sep. 14	Chap. 6: Electrical Systems	
Wed. Sep. 16	Chap. 6: Electrical Systems	Hmwk #2 due
Mon. Sep. 21	Chap. 6: Electrical Systems	
Wed. Sep. 23	Chap. 7: Fluid Systems	Hmwk #3 due
Mon. Sep. 28	Chap. 7: Fluid Systems	
Wed. Sep. 30	Chap. 7: Fluid Systems	Hmwk #4 due
Mon. Oct. 5	Chap. 7: Fluid Systems	
Wed. Oct. 7	Chap. 7: Fluid Systems	Hmwk #5 due
Mon. Oct. 12	No Class (Columbus Day)	
Wed. Oct. 14	Exam 1: Chapters 6, 7	
Mon. Oct. 19	Chap. 8: Time Domain Analysis	
Wed. Oct. 21	Chap. 8: Time Domain Analysis	Hmwk #6 due
Mon. Oct. 26	Chap. 8: Time Domain Analysis	
Wed. Oct. 28	Chap. 8: Time Domain Analysis	Hmwk #7 due
Mon. Nov. 2	Chap. 9: Frequency Domain Analysis	
Wed. Nov. 4	Chap. 9: Frequency Domain Analysis	Hmwk #8 due
Mon. Nov. 9	Chap. 9: Frequency Domain Analysis	
Wed. Nov. 11	Chap. 9: Frequency Domain Analysis	Hmwk #9 due
Mon. Nov. 16	Chap. 9: Frequency Domain Analysis	
Wed. Nov. 18	Exam 2: Chapters 8, 9	
Mon. Nov. 23	Chap. 10: Control Systems	Project due 11/25
Wed. Nov. 25	No Class (Thanksgiving)	
Mon. Nov. 30	Chap. 10: Control Systems	
Wed. Dec. 2	Chap. 10: Control Systems	Hmwk #10 due
Mon. Dec. 7	Chap. 10: Control Systems	
Wed. Dec. 9	Review	Project revision due
Mon. Dec. 14	Final Exam, 1:30 – 4:15 pm, Chap. 6-10	