

SYST 320: Dynamic Systems II

Fall 2008

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, 10:30 – 11:45 am.

Location: Science & Tech I, room 120.

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

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Office hours: Thu. 2 – 3:30 pm

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

Student Evaluation Criteria

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

Syllabus and Course Schedule

Last Updated: 8/26/08

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|--------------|-------------------------------------|-------------------|
| Tue. Aug. 26 | Review of SYST 220 | |
| Thu. Aug. 28 | Chap. 6: Electrical Systems | |
| Tue. Sep. 2 | Chap. 6: Electrical Systems | Hmwk #1 due |
| Thu. Sep. 4 | Chap. 6: Electrical Systems | |
| Tue. Sep. 9 | Chap. 6: Electrical Systems | Hmwk #2 due |
| Thu. Sep. 11 | Chap. 6: Electrical Systems | |
| Tue. Sep. 16 | Chap. 6: Electrical Systems | Hmwk #3 due |
| Thu. Sep. 18 | Chap. 8: Time Domain Analysis | |
| Tue. Sep. 23 | Chap. 8: Time Domain Analysis | Hmwk #4 due |
| Thu. Sep. 25 | Chap. 8: Time Domain Analysis | |
| Tue. Sep. 30 | Chap. 8: Time Domain Analysis | Hmwk #5 due |
| Thu. Oct. 2 | Exam 1: Chap 6, 8 | |
| Tue. Oct. 7 | Chap. 8: Time Domain Analysis | |
| Thu. Oct. 9 | Chap. 9: Frequency Domain Analysis | Hmwk #6 due |
| Tue. Oct. 14 | No Class (Columbus Day) | |
| Thu. Oct. 16 | Chap. 9: Frequency Domain Analysis | |
| Tue. Oct. 21 | Chap. 9: Frequency Domain Analysis | Hmwk #7 due |
| Thu. Oct. 23 | Chap. 9: Frequency Domain Analysis | |
| Tue. Oct. 28 | Chap. 9: Frequency Domain Analysis | Hmwk #8 due |
| Thu. Oct. 31 | Chap. 10: Control Systems | |
| Tue. Nov. 4 | Chap. 10: Control Systems | Hmwk #9 due |
| Thu. Nov. 6 | Chap. 10: Control Systems | |
| Tue. Nov. 11 | Chap. 10: Control Systems | Hmwk #10 due |
| Thu. Nov. 13 | Exam 2: Chap. 8, 9, 10 | |
| Tue. Nov. 18 | Chap. 10: Control Systems | |
| Thu. Nov. 20 | Chap. 11: Design of Control Systems | |
| Tue. Nov. 25 | Chap. 11: Design of Control Systems | Group project due |
| Thu. Nov. 27 | Thanksgiving | |
| Tue. Dec. 2 | Discussion of projects | |
| Thu. Dec. 4 | Review | Hmwk #11 due |
| Thu. Dec. 11 | Final Exam, 10:30 am – 1:15 pm | |