SYST 320: Dynamic Systems II
Course Overview, Fall 2014

It is often important to predict the behavior of systems that change in time. Such systems are called *dynamic systems*. Examples include mechanical systems (for example, the suspension system of a car), electrical systems (an audio amplifier), fluid systems (an estuary and the rivers that flow into it), biological systems (populations of interacting species), and so forth.

The objective of this course is to model and analyze a variety of systems using a common mathematical framework of linear differential equations. This course follows SYST 220, Dynamic Systems I. The first course covered mechanical systems and fundamental aspects of obtaining solutions using Laplace transforms and block diagrams. This course expands the set of application areas to include electrical systems, fluid systems, and other applications; and it 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: Tuesday, Thursday, 9:00 – 10:15 am.
Location: Planetary Hall, room 206

Pre-requisites: SYST 220 (dynamic systems I)
MATH 203 (matrix algebra)
MATH 214 (differential equations)
PHYS 260 & 261 (university physics II)

Instructor: John Shortle
E-mail: jshortle@gmu.edu
Phone: 703-993-3571
Room: Nguyen Engineering Building, room 2210
Office hours: Mon 2:30 – 3:30 pm, Tue 10:30 – 11:30 am

Teaching Asst.: TBD

Textbook: Palm, W. J. 2014. *System Dynamics*. McGraw-Hill, 3rd edition.

Student Evaluation Criteria

Homework and quizzes	12%
Professionalism	3%
Group project	10%
Midterm 1	20%
Midterm 2	20%
Final exam	35%

Syllabus and Course Schedule
Last Updated: 8/6/14

Tue. Aug. 26	Chap 7: Fluid Systems	
Thu. Aug. 28	Chap 7: Fluid Systems	
Tue. Sep. 2	Chap 7: Fluid 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. 6: Electrical Systems	
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: Chapters 6, 7, 8	
Tue. Oct. 7	Chap. 8: Time Domain Analysis	
Thu. Oct. 9	Chap. 8: Time Domain Analysis	Hmwk #6 due
Tue. Oct. 14	No Class (Columbus Day on Monday)	
Thu. Oct. 16	Dynamic systems in the SEOR curriculum	
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. 30	Chap. 9: Frequency Domain Analysis	
Tue. Nov. 4	Chap. 9: Frequency Domain Analysis	Hmwk #9 due
Thu. Nov. 6	Chap. 10: Introduction to Control Systems	
Tue. Nov. 11	Exam 2: Chapters 7, 8, 10	
Thu. Nov. 13	Chap. 10: Introduction to Control Systems	
Tue. Nov. 18	Chap. 10: Introduction to Control Systems	Hmwk #10 due
Thu. Nov. 20	Other Applications	
Tue. Nov. 25	Other Applications	Project report due
Thu. Nov. 27	No Class (Thanksgiving)	
Tue. Dec. 2	Other Applications	
Thu. Dec. 4	Review	Hmwk #11 due
Thu. Dec. 11	Final Exam, **7:30 – 10:15 am**, Chap. 6-10	