332: 417 Concepts of Control Design – Fall 2011

Instructor: Professor Zoran Gajic, ELE 222, tel. 5-3415, gajic@ece.rutgers.edu
Textbook: Z. Gajic and M. Lelic, *Modern Control Systems Engineering*, Prentice Hall, London, 1996.*
Office Hours: Tu, F 1:20-2:30 pm. **Class Home Page**: http://www.ece.rutgers.edu/~gajic/417.html

TOPICS:
Review of Feedback Properties (Sections 12.1-12.3 from *Linear Dynamic Systems and Signals* textbook)
Quiz 1 (**Prerequisite Quiz)** (**2%** of the course grade, **F Sept. 9**)
State Space Approach (Chapter 3)
System Linearization (Chapter 1: Section 1.6, also Section 8.6 in *Linear Systems and Signals* textbook)
Control of Nonlinear Systems via Linearization (Class Notes). **Project #1 assigned**.
Introduction to MATLAB/Simulink (Appendices C&D from Linear Systems and Signals textbook)
Quiz 2 (**2%** of the course grade, **F Sept. 23**)
Transfer Function Approach (Chapter 2)
Quiz 3 (**1%** of the course grade, **F. Oct. 2**)
EXAM I, Middle of October, 12:00-1:20 pm, SEC 220 (**30%** of the course grade)

Controllability and Observability Concepts and Observer Design (Chapter 5)
Quiz 4 (**2%** of the course grade, **F Oct. 28**)
Controller Design via Pole Placement (Section 8.2). **Project #2 assigned**.
Stability Concept and Stability Robustness Margins (Chapter 4)
Quiz 5 (**1%** of the course grade, **F Nov. 4**)
Control System Design Specifications (Chapter 6)
EXAM II, Middle of November, 12:00-1:20 pm (**30%** of the course grade)

Design of Controllers via Root Locus (Chapter 8)
Quiz 6 (**1%** of the course grade, **F Nov. 18**)
Design of Controllers via Bode Diagrams (Chapter 9). **Project #3 assigned**.
Quiz 7 (**1%** of the course grade, **F Dec. 2**)
Optimality Concept and Design of Optimal Controllers (Chapter 10)
Stochastic Systems and Design of Optimal Kalman Filter (Chapter 10)
Design (Tuning) of PID Controllers (Class Notes)

Grading : $A \geq 90, \quad B^{+} \geq 82, \quad B \geq 75, \quad C^{+} \geq 67, \quad C \geq 60, \quad D \geq 50$
MATLAB/Simulink Projects = 30%; EXAM I = 30%; EXAM II = 30%; Quizzes = 10%.

Sakai: Exam results, project assignments and results, and homework solutions will be posted on Sakai's website.
* The textbook is currently out of print. It will be available on the web. Some lectures (ppt- and pdf-slides) and some chapters (pdf files) can be downloaded from the class website http://www.ece.rutgers.edu/~gajic/417.html

Homework Problems:
Chapter 1: 5, 6, 7, 8, 9, 10, 11, 12 (8)
Chapter 2: 1a,b,c, 3, 9, 10, 12, 13, 14, 16, 17 (9)
Chapter 3: 1, 2, 3, 4, 5, 7 and 8.6 from *Linear Dynamic Systems and Signals* (7)
Chapter 4: 1, 2, 3, 4, 7, 8, 11, 14, 16, 17, 18, 24, 25 (11)
Chapter 5: 1, 2, 3, 5, 6, 7, 9, 10, 14 (9)
Chapter 6: 3, 4, 5, 6, 7, 8, 9 (6)
Section 8.2: 1, 2 (2)