

EE 3312

Systems and Control

4(3-1-3*)

Dr. I. Altas
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Class: MWF 1:30–2:30 PM Room H211
Tutorial: Tues 1:30-2:30 PM Room H211

Calendar Description

Concepts of modeling, and analysis of systems in time and frequency domains, feedback and feed forward controllers, stability criteria, design of controllers. Prerequisite: EE 2783, MATH 3503 and APSC 1023 or ME 1113

Course Content

1. Modeling of physical systems: block diagram representation, and reduction
2. Mathematical model of systems: differential equation, state-space, transfer function
3. Analysis in the time and frequency domain: system specifications
4. Stability: definition, Routh Hurwitz criterion
5. Open and closed loop system: stability, sensitivity, tracking and disturbance rejection
6. Feedforward and feedback control structures
7. Typical feedback controllers such as proportional (P), proportional and integral (PI), proportional, integral and derivative (PID), variants of PID, lead and lag compensators, state-feedback controller and state-feedback with integral action.
8. Close loop frequency response and its relationship to open loop frequency response: Nyquist criterion.
9. Principles of design of control system in the time and frequency domain
(Total 36 hours)

Labs

1. Matlab/Simulink and Real Time Workshop
2. System analysis using MATLAB
3. Simulation and analysis of systems using Analog Computer
4. Experimental determination of transfer function of physical systems
5. Feedback control of a physical system

Course Evaluation

Assignments	10%
Labs	10%
Quiz	15%
Test	15%
Final	50%

Text

Lecture notes

References

1. G.F.Franklin, J.D.Powell and A.Emani-Naemi, Feedback Control of Dynamic Systems. Addison Wesley Publishing, Ontario, 1994
2. R.T.Stefani, C.J. Savant and G.H.Hostetter, Design of Feedback Control Systems, Saunders College Publishers, Toronto, 1995
3. B.J.Kuo, Automatic Control System, Prentice-Hall, Englewood Cliffs, N.J. 1995
4. N.S.Nice, Control System Engineering, Benjamin/Cummings Publishing, Don Mills, Ontario, 1992
5. R.C.Dorf, Modern Control System, Addison Wesley Publishing 1989
6. K.Ogata, Modern Control Engineering, Prentice-Hall, 1990

Alpha-Numeric Conversion

85-100	A+	60-64	B-
80-84	A	55-59	C+
75-79	A-	50-54	C
70-74	B+	40-49	D
65-69	B	<40	F

Additional Requirements

1. Attendance in all labs is compulsory for all students registered in the course.
2. To be eligible for a passing grade, (i.e., any grade other than `F'),(i) a student must accumulate 50% final exam and (ii) at least 5 marks (out of 10 marks) in the laboratory evaluation.

Test/Quiz Date

Closed book

Quiz 1	Monday, February 12, 2007
Quiz 2	Monday, February 19, 2007
Quiz 3	Monday, February 26, 2007
TEST	Friday, March 16, 2007
Quiz 4	Monday, March 19, 2007
Quiz 5	Monday, March 26, 2007

Deferred Exams

University regulations on deferred exams are described in Section V.C of the current on-line Undergraduate Calendar. All deferred exams in courses offered by the Department of Electrical and Computer Engineering are scheduled to be written on the fourth day of classes in the following term. There are no exceptions.