Advanced Digital Control Systems

Code	CreditHours
EE-972	3-0

CourseDescription

This course is about the design and analysis of a linear system by applying digital control. The controllers / compensators in modern control systems are implemented on digital computers. It is therefore necessary that the effects of discretizing the system should be considered while designing the controllers. The objective of this course is to provide an in-depth coverage of digital control. The controllers in modern control systems are implemented on digital computers. The course will serve to prepare the students to undertake research and development related to sampled data linear systems.

TextBook:

1. Discrete-Time Control Systems, Katsuhiko Ogata, 2nd Edition, Pearson Education, Inc.ISBN-13. 978-0130342812

ReferenceBook:

1. Digital Control of Dynamic Systems, 3rd Edition, G.F. Franklin, J.D. Powell, M. Workman, Pearson Education, Inc.ISBN: 0-201-82054-4,.
2. Digital Control System Analysis and Design, 3rd Edition, C.L. Phillips, H.T. Nagle, Prentice-Hall, Inc.ISBN-13. 978-0133098327 ·

Prerequisites

Discrete mathematics, Z transform, State space methods

ASSESSMENTSYSTEMFORTHEORY

Quizzes	15%
Assignments	10%
MidTerms	30%
ESE	45%

TeachingPlan

Week No	Topics	LearningOutcomes
1	Introduction	CourseOutline,objectives,teachingplan,assessment method, conceptsreview
2-6	Z – Transform	Introduction to Discrete-Time Control Systems: Digital Control Systems: Quantizing and Quantization Error: Data Acquisition and Conversion: Z – Transform and the Inverse Z – Transform: Z – Transform method for difference equations Emulation of Analog Controllers
7-8	Pulse Transfer Function	Pulse Transfer Function: Discrete and Hybrid Systems
9	**MIDTERMEXAM**	
10-12	System Analysis and Controller Design	Stability Analysis Techniques Digital Controller Design Digital Filter Structures and Quantization Effects State-Space Representation of Discrete-Time Systems: Solution of Discrete-Time State Space Equations:
13-17	Advance Topics	Adaptive Inverse Control Optimal two-sided (Wiener) solution Optimal one-sided (Shanon-Bode) solution Adaptive Linear Filters System Identification Sources of Modeling Errors
18	**FINALEXAM**	