



Philadelphia University
Faculty of Engineering
Department of Computer Engineering
Second Semester, 2008/2009

Course Syllabus

Course Title: Digital Control	Course code: 640480
Course Level: Fifth Year	Course prerequisite: 640451
Class Time: 8:15 - 9:30 Sun., Tues., Thurs.	Credit hours: 3

Academic Staff

Specifics

Name	Rank	Office Number / Location	Off. Hs	E-mail Address
Dr. Sabah Sheet	Associate Prof.	810	10.10 – 11.00, 13.00 – 14.00 S/T/R	sabsheet@yahoo.com

Course description:

Digital Control is an essential part of modern mechatronic systems. This course will introduce students to popular digital control theorems and techniques used in the industry.

Course objectives:

- Understand the basic concepts of digital control theory
- Design digital controllers
- Program digital controllers using MATLAB
- Analyze the response of digital controllers

Course components

Text Book: Digital Control of Dynamic Systems by Franklin, Powel, and Workman. 3rd edition. 1998 Addison-Wesley

Teaching methods:

The course is a three hours class. During the course, students will have two homework, two exams, and one final.

Learning outcomes:

Knowledge and understanding of:

- Review of Analog Control Theory.
- Basic Digital Control Theory.
- Comparison among different digitization techniques.
- Digital Control Design Methods.

Cognitive skills (thinking and analysis)

- Analyze digital systems in order to Design controllers.

Communication skills (personal and academic).

Students will be asked to discuss their homework solutions with the instructor.

Practical and subject specific skills (Transferable Skills).

The student will be asked to use MATLAB program to code several digital control techniques.

Assessment instruments

<u>Allocation of Marks</u>	
Assessment Instruments	Mark
First examination	20
Second examination	20
Final examination	50
Homework #1	5
Homework #2	5
Total	100

Documentation and academic honesty

The course textbook is copyright protected. Students are encouraged to purchase this text book. Students are also advised to avoid plagiarism during different home works and assignments.

Course academic calendar

Week	Basic and support material to be covered	Homework due dates
Oct 5th	Introduction	
Oct 12th	Review of continuous Control I	
Oct 19th	Review of continuous Control I	
Oct 26th	Intro. to Digital Control Digitization, Sampling, PID Control	
Nov 2nd	Discrete Systems Analysis I Linear Difference Equation, Discrete Transfer Function, Z-Transform	
Nov 9th	Discrete Systems Analysis II Stability, Block Diagrams, Pulse Response	
Nov 16th	Discrete Systems Analysis III Signal Analysis and Dynamic Responses	Exam I
Nov 23rd	Discrete Systems Analysis IIII Frequency Response, Z-Transform Properties	
Nov 30th	Discrete Equivalents I Design via Numerical Integration	
Dec 7th	<i>EID FITR VACATION</i>	
Dec 14th	Discrete Equivalents II Zero-Pole Matching Equivalents, Hold Equivalents	Exam II

Dec 21st	Design using Transform Techniques I System Specifications, Design by Emulation	
Dec 28th	Design using Transform Techniques II Discrete Root Locus	
Jan 4th	Design using Transform Techniques III Frequency Response Methods	
Jan 11th	Case study of digital control systems	
Jan 18th	<i>FINAL EXAMS</i>	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute class/tutorial.

Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Course references:

Books:

1. Ogata, "Discrete-Time Control Systems". Printice Hall
2. Kuo, Benjamin, "Digital Controls systems", Saunders collage, Publishing, 2nd edition