FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Engineering & Technology

Digital Control Systems

Information :

Course Code :	CMP 475	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours
Department :	Department of Mechanical Engineering				

Instructor Information :

Title	Name	Office hours
Professor	Abdel Monem Abdel Hamid Ahmed Seif	5
Professor	Abdel Monem Abdel Hamid Ahmed Seif	5
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	3
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	3

Area Of Study :

Bytheendofthecoursethestudentswillbeableto:
1) Demonstrateknowledgeofbasic discrete time control systems.
2) Gain techniques and methods for control of feedback digital control systems.
3) Be aware of implementation issues and available hardware for feedback control of mechanical control systems.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Identifybasicappliedand engineeringscience.
2 -	Identify principles ofdiscrete time systems analysis and modeling of digital controlof various fields of mechanical engineering and some other engineering disciplines.
3 -	Develop conceptual and specific designmethods for digital feedback control systems.
b.Intellectual Skills: :	
1 -	Definecomputer-controlled design problems in mechanical engineeringand evaluate designs, processes, and performance and propose improvements.
c.Professional and Practical Skills: :	
1 -	Write MatLab code for developed design methods.
2 -	Apply gained hardware and software skills to controller design indiverse mechatronics applications.
d.General and Transferable Skills: :	
1 -	Collaborate effectively within multidisciplinary team.
2 -	Share ideas, communicate effectively and work in stressful environmentand within constraints.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Review of Continuous-Time Systems Analog versus Digital Systems	4	2	2
The z-transform and its Inverse. Difference Equations and State Space Models Solution via the z-transform.	8	4	4
Discretization Methods and Sampled-Data Converters.	4	2	2
Stability Analysis of Discrete-Time Systems and root locus method.	8	4	4
State Space analysisand Controllability and Observability of Discrete-Time Systems.	8	4	4
Design Using Static Gain State Feedback Dynamic Observer Design.	8	4	4
Discrete-Time Systems Stability and Control via the Second Method of Lyapunov.	8	4	4
Frequency Domain design methods of Discrete-Time Systems.	8	4	4
Computer Controlled Systems and digital controller implementation issues.	8	4	4

Teaching And Learning Methodologies :

Lectures
Tutorial
Class discussions and activities
Homework and self-study

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
FinalWrittenExam	40.00	16	
FirstAssignment	5.00	4	
MidTermExam	20.00	6	
SecondAssignment	5.00	9	
SecondMidterm	20.00	11	

Recommended books :

M.S. Fadali and A. Visionli, Digital Control Engineering: Analysis and Design, Prentice Hall, USA.
Benjamin C. Kuo, Digital Control Systems, Holt, Reinhart and Winston Inc., USA