FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Engineering & Technology

Control Systems

Information :

Course Code :	CMP 470	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Mechanical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	3
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	5

Area Of Study :

Develop studentsô knowledge about the basic concepts of classical control systems.
Introduce students to control systems theory considering only the Continuous Linear Time Invariant systems.
Train Students to derive transient response and steady state error, do stability analysis, perform root locus analysis, and perform frequency response analysis and state space methods.

Description :

Introduction to feedback control systems; Block diagram reduction and signal flow graphs; System time response and stability; Feedback systems performance specifications; Time; Root-Locus; Frequency response analysis techniques; State space analysis of multivariable systems; Controllability, observability, and sensitivity; Basic controller design in frequency domain and state space; PID, lead-lag and lag-lead compensation; Analysis and design of feedback control systems using Matlab.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Define the objective of continuous control system.
2 -	Outline the mathematical modeling of different analog system.
3 -	Recall the mathematical tools dealing with control systems.
4 -	Explain the different transient time responses and steady state error in control systems.
5 -	Illustrate how the stability of control systems could be evaluated.
6 -	Explain how to draw the root locus and bode diagram for control systems.
7 -	Describe modeling and analysis using state space representation.
8 -	Describe controller tuning.
b.Intellectual Skills: :	
1 -	Select appropriate mathematical and different methods for modeling and analyzing systems.
2 -	Design continuous control systems applying appropriate knowledge and principles.
3 -	Select appropriate solutions for engineering problems based on analytical thinking.
4 -	Analyze systems, processes and components.

c.Professional and Practical Skills: :	
1 -	Write Matlab code for developed design methods.
2 -	Apply gained hardware and software skills to controller design in diverse mechatronics applications.
d.General and Transferable Skills: :	
1 -	Efficiently manage tasks, time and resources.
2 -	Use digital libraries and demonstrate efficient IT capabilities.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to Control Systems	4	2	2
Modeling Analogy	4	2	2
PID Controller, Transient Response Analysis	8	2	6
Steady-State Response Analysis	4	2	2
The Root Locus Method	12	6	6
Lead Compensation Design Based on The Root Locus Method.	4	2	2
Lag Compensation Design Based on The Root Locus Method.	4	2	2
Bode Diagrams	6	4	2
Lead and Lag Compensation Design Based on Bode Diagrams	8	4	4
State Space Representation	6	4	2

Teaching And Learning Methodologies :

Interactive Lecturing
Problem solving
Experiential learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	5.00		
Final Exam	40.00		
Lab Exper.	10.00		
Mid- Exam 1I	15.00		
Mid- Exam I	15.00		
Participation	5.00		
Quizzes	10.00		

Course Notes :

Course Notes (in MS Power Point or PDF format)

Recommended books :

ÅAutomatic Control Systems, B. C. Kuo and F. Golnaraghi, 9th edition or higher, 2010, John Wiley & Sons, Inc.
ÅModern Control Systems, R. C. Dorf, R. H. Bishop, 12th edition or higher, 2010, Prentice Hall
ÅLinear Control System Analysis and Design with Matlab, J. J. DôAzzo, C. H. Houpis and S. N. Sheldon, 5th edition or higher, 2003, Marcel Dekker, Inc.
ÅControl Systems Engineering, N. S. Nise, 6th edition or higher, 2010, John Wily