Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	**Erbil Technology College**	
Department	**Automation Industrial Technology Engineering**	
Module Name	**Control I**	
Module Code	**C703**	
Degree	**Technical Diploma** ☐ **Bachelor** * **High Diploma** ☐ **Master** ☐ **PhD** ☐	
Semester	**7**	
Qualification	**MSc Electronic & control Engineering**	
Scientific Title	**Lecturer**	
ECTS (Credits)	**6**	
Module type	**Prerequisite** ☐ **Core** x **Assist.** ☐	
Weekly hours	**4**	
Weekly hours (Theory)	**(2)hr Class**	**(64)Total hrs Workload**
Weekly hours (Practical)	**(2)hr Class**	**(98)Total hrs Workload**
Number of Weeks	**12**	
Lecturer (Theory)	**Brzo Aziz Qadir**	
E-Mail & Mobile NO.	**Brzo.qadir@epu.edu.iq**	
Lecturer (Practical)	**Jwan**	
E-Mail & Mobile NO.		
Websites	**www.Epu.edu.iq**	

Course Book

Course Description	This course offers a more advanced discussion of control systems, introducing many modern control techniques, and implementation issues. In particular, students who successfully complete this course should have: • an exposure to modern control tools (e.g., observers, state variable feedback, internal model control) • a basic understanding of various factors which limit the achievable control system performance (e.g., time delays, non-minimum phase zeros) • experience in several lab implementations of control systems • initial exposure to various control implementation issues (e.g. Sampled data systems, Actuator saturation, Anti-windup schemes) • an initial exposure to more advanced topics (e.g., multivariable systems, pole assignment) • some knowledge of various case studies of successful modern control implementations • introduction to empirical modelling and system identification.
Course objectives	The aim of the course is to give an introduction to the control system analysis and design. The purpose of the course is to introduce the nature of nonlinearities found in control systems both in the forward path and in the feedback path. Some times nonlinearities may be used to adjust the performance of the system. Students are expected to learn why standard methods of analysis and design in linear systems are not applicable in nonlinear system. Methods suitable for nonlinear systems are introduced and their applications are explored. An ability to apply knowledge of mathematics, science, and engineering An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
Student's obligation	The presence of students in both lectures and Lab will have additional credit .He /She is required to continuously follow the lectures ,Submits homework and reports .Anticipate Tests or quizzes any time in Class or Lab
Required Learning Materials	Psychics ,Chemistry and Mat

Evaluation	**Task**		**Weight (Marks)**	**Due Week**	**Relevant Learning Outcome**
	Paper Review				
	A	Homework	10		

		Class Activity			
		Report	10		
		Seminar	4		
		Essay			
		Project			
	Quiz		10		
	Lab.		10		
	Midterm Exam		16		
	Final Exam		40		
	Total				
Specific learning outcome:	1-Understanding of the essentials of Control system. 2- Understanding of the essentials of using Mtlab program in Control System. 3- Understanding of the essentials of Modeling and design of Control System. 4- The ability of a student use simulation program. 5-Using simulation program for experiment will be done in Lab.				
Course References:	R.C. Dorf, Modern Control Systems, Addison-Wesley, 5th (1989) or any later edition. J.J. D'Azzo and C.H. Houpis, Linear Control System Analysis and Design, McGraw-Hill, 3rd (1988) or any later edition. Ogata, K., Modern Control Engineering, Prentice-Hall, [2002] Hsu, J. C. & A. U. Meyer, Modern Control Principles and Applications, McGraw-Hill, [1968]				

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction: definition and classification of systems, control systems.	1	Define control system
Open Loop control System	2	Learn property of open loop control system
Closed loop control system	3	Learn property of closed loop control system
Comparison closed loop & open loop control system	4	Distinguish open loop and closed

		loop control system
Water control system.	5	Given application of open loop control system
Liquid Level Control System	6	Given application of closed loop control system
Feed back : Closed system to control the pressure	7	Solve the practical examples
Room Temperature control system	8	Explain
Feedback connection	9	Given the types of connection.
Time response control system	10	Draw the block diagram.
Basic rules with block diagram transformation	11	Determine the calculation for block diagram control system
Find transfer function for feedback control system	12	Solving examples
Signal Flow Graph	13	Solving examples
Practical Topics	**Week**	**Learning Outcome**
Introduction and Control Basics Matlab software	1	Introduction of Matalb
Variable assignment	2	Represented variables.
Scalar, Vector and Matrix: Basic Operation.	3	Solve examples.
Useful matrix operations Determinant :det(m),Inverse :inv(m),Rank: rank(m),I by j matrix of m= Zeros :zeros(I,j), I by j of matrix of ones :m=ones(I,j), I by j of matrix of:m=eye(i).	4	Learn Application of matrices.

Graphics: Basic 2-D Plots, Specialized 2-D plots	5	Learn plotting variables.
Using Matlab to create models	6	How build model
• Why model? - Represent - Analysis	7	Using model for solving problems
• What kind of systems are we interested?	8	Application on feedback system.
- Single-Input-Single-Output (SISO)	9	Determination of response
Response of second order control system	10	Solving second order examples
Find response of feedback control system	11	Find overall output response
Pole & Zeros Map		

Questions Example Design:

Q1)A- Write short notes on open loop control systems and closed loop control systems. Discuss their advantages and disadvantages. 16M

B-Explain briefly the room temperature control system below and draw the control block diagram.

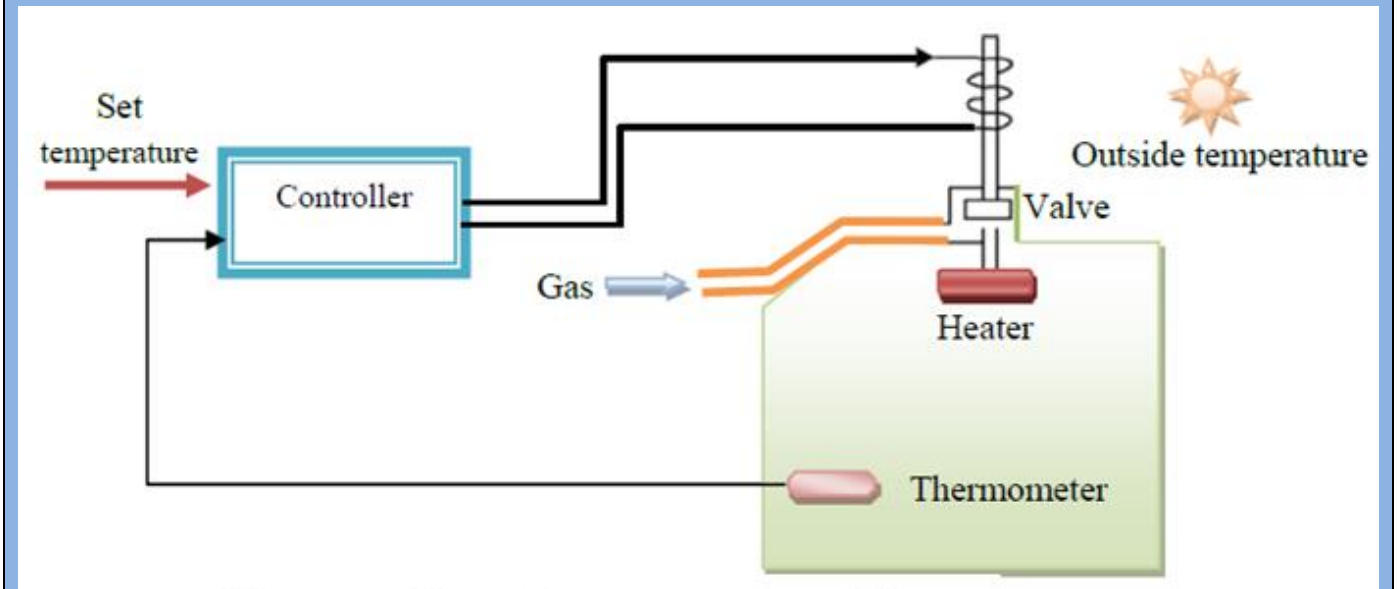

Figure -3- Room Temperature Control System

Extra notes:

I will assess the students continuously through their activities in the class. Any student with thoughts about learning, and suggestions of different way of dealing with difficulties and problems will be very welcomed.
Showing relevant laboratory equipment, technical videos, and other academic activities are part of the course model.

External Evaluator

General evaluation of course objectives and content.

General evaluation of lectures/ Practical sessions.

General evaluation of lecturer.