Jordan University of Science and Technology

Faculty of Engineering

Chemical Engineering Department

CHE551 Process Dynamics And Control - JNQF Level: 7
Second Semester 2023-2024

Course Catalog
3 Credit Hours. Introduction to practical and theoretical aspects of process control, process modeling, transfer functions, MATLAB, dynamics of open-loop systems, feedback control system, instruments of control system, control laws (P, PI, PD and PID), block diagrams, dynamics of closed-loop systems, stability analysis, root-locus analysis, tuning of controllers, frequency analysis, Bode stability, cascade control, feed-forward control, other control schemes.
Teaching Method: On Campus

Text Book	
Title	Process systems Analysis and Control
Author(s)	D.R. Coughanowr, S.E. LeBlanc
Edition	3rd Edition
Short Name	Textbook
Other Information	2008

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#1	Process Dynamics and Control	D.E. Seborg, T.F. Edgar and D.A. Mellichamp	3rd Edition	
Ref#2	Process Control: Designing Processes and Control Systems for Dynamic Performance	T.E. Marlin	2nd Edition	
Ref#3	Principles and Practice of Automatic Process Control	C.A. Smith and A.B. Corripio	2nd Edition	

Instructor	
Name	**Prof. Mamdouh Allawzi**
Office Location	CH2 L2

Office Hours	
Email	mallawzi@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 12:30 - 13:30 Room: CH2107

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
224520	CHE452 Applied Mathematics And Modelling For Chemical Engineers	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Weeks 1, 2	Introduction to basic of process control and closed loop block diagram	**From Chapter 1.** From **Textbook**
Weeks 3, 4	Introduction to laplace transform	**From Chapter 2&3 .** From **Textbook**
Week 5	Response of first order systems and physical examples	**From Chapter 4&5.** From **Textbook**
Week 6	Response of higher order systems	**From Chapter 6.** From **Textbook**
Week 7	Linear closed systems	**From Chapter 8.** From **Textbook**
Weeks 8, 9	Controllers and final control elements	**From Chapter 9.** From **Textbook**
Weeks 10, 11, 12	Closed loop transfer functions and transients response	**From Chapter 11&12.** From **Textbook**
Weeks 13, 14	Controller stability	**From Chapter 13.** From **Textbook**
Week 16	Frequency Response and body stability	**From Chapter 14&15.** From **Textbook**

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Apply the fundamentals of Laplace transforms in order to perform the dynamics of chemical systems. [1SO1] [1L7K1]	15%	
Utilize fundamentals of mathematical modelling in order to perform system response analysis and characteristics for open loop system. [1SO1] [1L7K1]	20%	
Implement fundamental knowledge of closed-loop control systems to determine system response to feedback close loop. [1SO1] [1L7S1]	25%	

Design the controller, final control element (i.e. Valve design) and Transmitters. [1SO2] [1L7C1]	20%	
Design the controller stability. [1SO2] [1L7S2]	10%	
Perform controller tuning using mathematical techniques and computer software (Matlab). [1SO6] [1L7C2]	10%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
60	30				10	

Relationship to NQF Outcomes (Out of 100%)				
L7K1	L7S1	L7S2	L7C1	L7C2
35	25	10	20	10

Evaluation	
Assessment Tool	**Weight**
Homework & Quizzes	10%
1st Exam	25%
2nd Exam	25%
Final Exam	40%

Policy	
assignments	Each assignment is due one week later
Cheating	Cheating Not tolerated. University rules will be strictly applied
Attendance	Attendance is very important for the course. Students missing more than 10% of total classes (5 lectures) are not allowed to enter the FINAL Exam according to university regulations.

Date Printed: 2024-03-03