



ChE 551: Process Dynamics and Control

3 credit hour, 3 contact hour lecture, 3 credit hour Eng.

Instructor

Instructor: Dr. Mamdiuh Allawzi

E-mail: mallawzi@just.edu.jo

Textbooks & References

A. Textbook

	Textbook 1
Title	Process Dynamics and Control
Author(s)	D.R. Coughanowr, S.E. LeBlanc
Publisher	McGraw Hill
Year	2009
Edition	3 rd

B. References

1. Process Dynamics and Control, D.E. Seborg, T.F. Edgar and D.A. Mellichamp, 3rd Edition, 2011.
2. Principles and Practice of Automatic Process Control, C.A. Smith and A.B. Corripio, 2nd edition, 2005.
3. Chemical Process Control, George Stephanopoulos, 3rd, 1985

Specific Course Information

A. Course Catalog:

Introduction to practical and theoretical aspects of process control, process modeling, Laplace Transform, 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.

B. Prerequisites or co-requisites

ChE 452 Applied Mathematics and Modeling for Chemical Engineers

C. Required/Elective or Selected Elective

Required

Objectives and Outcomes*

1. Apply the fundamentals of Laplace transforms in order to perform dynamics of chemical systems. Analysis system interactions. [1,2]

2. Apply fundamentals of mathematical modelling in order to perform system response analysis and characteristics for open loop system. [1,2]

3. Apply fundamental knowledge of closed loop control system to determine system response to feedback close loop. [1,2] 4. Design the controller, final control element (i.e. Valve design) and Transmitters. [1,2,6]

5. Design the controller stability. [1,2,6]

6. Perform controller tuning using mathematical technique and computer software (matlab). [1,2]

Contribution of Course to Meeting the Professional Component

Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
45	40				15	

Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
y	y	-	-	-	-

Topics Covered

1. Introduction to basic of process control and closed loop block diagram
2. Introduction to laplace transform
3. Response of first and higher order systems and physical examples
4. Controllers types and final control elements
5. Closed loop transfer functions and transients response
6. Controller stability and controller tuning
7. Frequency Response and body stability

Evaluation

Assessment Tool Expected Due Date Weight

Homework & Quizzes One week after homework problems are assigned 10%

First Exam According to the department schedule 25 %

Second Exam According to the department schedule 25 %

Final Exam According to the university schedule 40 %

* Number in brackets refer to the Program outcomes