Department of Chemical Engineering

Course Syllabus

Course Code & Number	CHE 307		
Course Title	Process Dynamics and Control		
Credit & Contact Hours	3 Credits; 3 Lectures, 0 Laboratories (3-0-3)		
Instructor	Dr. Mohammad Anwar Parvez		
Office Location	Room# 2303		
Instructor's Office Phone	00966 13 720 5175		
Instructor's Email	maparvez@uhb.edu.sa	**Homepage link**	https://www.uhb.edu.sa/Pages/MemberDetails.aspx?Param=college&Ref=29&Member=440
Prerequisites	CHE 304		
Course Description	The intent of this course is to present the fundamental principles in modeling and control of chemical processes. The topics covered in this course include: modeling of chemical processes, Laplace transfer and state-space models, approximation of complicated models, dynamics and simulation of different systems, feedback controllers, PID tuning, design and instrumentation of closed-loop control systems, control block diagrams, frequency response analysis, Bode and Nyquist stability criteria		
Course Objectives	i. To introduce modeling of chemical process ii. To apply knowledge of mathematics {Linearization, Laplace Transforms and Frequency Response] and use it for solving process control problems iii. To introduce feedback and feedforward control loops and stability criteria.		
Required Textbook	Textbook: Process Dynamics & Control, by Dale E. Seborg, Thomas F. Edgar, and Duncan A. Mellichamp, Wiley, New York (2017), 4th Edition Reference Book: Process Systems Analysis and Control Donald R. Coughanowr Steven E. LeBlanc, McGraw-Hill Chemical Engineering Series, New York (2009), 3rd Edition		

Grading Scheme

Assessments	Assessments Task	Week due	Proportion of Final Mark (%)
1	Quizzes	fortnightly	10
2	Home-works	fortnightly	10
3	Midterm exam	5	30
4	Term Project	12	10
5	Final exam	16	40

Course Learning Outcomes & Mapped So's

- To develop block diagram description of processes and feedback and feedforward control loops. (ABET SO 1)
- To apply knowledge of mathematics [Linearization, Laplace Transforms and Frequency Response] to model and solve models describing dynamics of chemical processes. (ABET SO 1)
- To be able to do modeling of steady and unsteady state chemical processes. (ABET SO 1)
- To work on design and evaluate control systems using software (ABET SO 2)
- Function professionally and behave ethically (ABET SO 4)

Attendance

	Number of unexcused absences			Tot Absences (excused* + unexcused)
	Warning I	Warning II	DN	DN
5 Hours / Week (45 Hours Total)	4 Hours (8%)	8 Hours (17%)	11 Hours (25%)	15 Hours (33%)
Laboratory session	NA	NA	NA	NA

Topics

Weeks	List of Topics
1-3	Introduction to Process Control
	Theoretical Models of Chemical Processes
	Laplace Transforms
4	Transfer Function Models
	Dynamic Response Characteristics of More Complicated Processes
5-8	Development of Empirical Models from Process Data
	Feedback Controllers
	Control System Instrumentation

	9	Process Safety and Process Control
	10	Dynamic Behavior and Stability of Closed-Loop Control Systems
	11	PID Controller Design, Tuning, and Troubleshooting
	12	Control Strategies at the Process Unit Level