Fall 2020

CHE 734-101: Chemical Process Dynamics and Control

Patrick Robinson

CHE 734 - Chemical Process Dynamics and Control (Fall 2020)

Course Description: Mathematical principles of process dynamics and control; derivation and solution of differential equations describing the behavior of typical chemical engineering processing units; and mathematical analysis and design of control systems. Digital and sampled data control systems also discussed.

Prerequisite: CHE 626 or equivalent. Corequisites: CHE 611, CHE 612 or equivalent

Textbook: Simon, L. (2013) Control of Biological and Drug-Delivery Systems for Chemical, Biomedical, and Pharmaceutical Engineering, John Wiley & Sons, Inc., Hoboken, NJ, USA. ISBN-13: 978-0470903230

Please Note: Author is an NJIT professor and a great resource for questions!

Instructor: Dr. Patrick Robinson
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Process Controls and Modeling Team Lead, Phillips 66 Bayway Refinery

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Office: (908) 523-5003

Lecture Hours: Synchronous online (Tuesday, 6:00pm – 8:50pm)

Office Hours: By appointment via email or phone

Credits: 3

Please note: Instructor works for the Phillips 66 Bayway Refinery in Linden, NJ. This facility operates 24 hours a day, 7 days a week, and every day of the year. In the case of a plant emergency and the instructor's assistance is needed, the class will unfortunately be canceled. Expect an email prior to the class. ***IF NO EMAIL IS SENT, ASSUME CLASS IS ON TIME!!!***

Week	Topic (Preliminary / Subject to change based on time)
1 (9/1/20)	Introduction (Chapter 1)
2 (9/8/20)	*No class September 8 as Monday Classes Meet*
3 (9/15/20)	Mathematical Models (Chapter 2)
4 (9/22/20)	Linearization and Deviation Variables (Chapter 3)
5 (9/29/20)	Stability Considerations (Chapter 4)
6 (10/6/20)	Laplace Transforms of Linear Systems (Chapter 5)
7 (10/13/20)	Inverse Laplace Transforms (Chapter 6)
8 (10/20/20)	Transfer Function; Open-Loop Dynamic Responses (Chapter 7 & 8)
9 (10/27/20)	**Midterm Examination**
10 (11/3/20)	Closed-Loop Responses (Chapter 9)
11 (11/10/20)	Frequency Response Analysis (Chapter 10)
12 (11/17/20)	Stability Analysis of Feedback Systems (Chapter 11)
13 (11/24/20)	Design of Feedback Controllers (Chapter 12)
14 (12/4/20)	Feedback Control of Dead-Time Systems (Chapter 13)
TBD	**Final Examination**

Grading scheme: Homework 10%, Midterm Examination 30%, Project Assignment 30%, Final Examination 30%

Additional Readings: Provided prior to lectures for discussion, homework, and special topics

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