

Dynamics and Process Control

1. **Course number and name:** 020PROCS3 Dynamics and Process Control
2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours
3. **Name of instructor:** Mansour Tawk
4. **Instructional Materials:**
 - Chemical Process Control : An Introduction to Theory and Practice 1st Edition, George Stephanopoulos
 - Process Dynamics and Control, 4th Edition , Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, Francis J. Doyle III

5. Specific course information

a. Catalog description:

Introduction to process control: characteristics and associated problems. Dynamic modeling of chemical processes. Laplace transform and solutions of differential equations. Transfer function and dynamic behavior of first and second order systems. Closed loop control. Basic principles and new techniques relating to the dynamics of continuous, discontinuous and hybrid processes. Development of a modeling methodology (development and structuring of models) and dynamic stimulation of processes based on algebra-differential processing with extensions for the identification of parameters, simulation under constraints and optimization.

b. Prerequisites: 020PROCS2 Introduction to continuous and discontinuous processes

c. Required/ Selected Elective/Open Elective: Required

6. Educational objectives for the course

a. Specific outcomes of instruction:

- Analyze and dynamic control of feedback process
- Performances : stability, precision, speed
- Design of P, I, D controller for closed loop systems
- Matlab Applications

b. PIs addressed by the course:

PI	1.3	2.1	2.3	7.1
Covered	x	x	x	x
Assessed	x	x	x	x

7. Brief list of topics to be covered

- Introduction
- Introduction to feedback control
- Dynamic behavior of feedback controlled processes
- Stability analysis of feedback systems

- Design of feedback controllers
- Frequency response analysis of linear processes
- Design of feedback control systems using frequency response techniques