

## **ChE 3112 Introduction to Process Control**

Required course for ChE program students who entered after May 2003

**Catalog Description:** Transient models of chemical processes and introduction to classical feedback control including tuning. P, PI, and PID controllers.

**Prerequisites:** ChE 2003, Math 3073.

**Corequisites:** n/a

**Prerequisites by Topic:** Steady state material and energy balances, differential equations including Laplace transforms (ChE 2003, Math 3073)

**Recent Textbook:** *Process Dynamics and Control, 2<sup>nd</sup> Edition*, by Seborg, Edgar and Mellichamp, Published by John Wiley & Sons, 2004.

**Other Required Material:** None

**Course Objectives:** By the end of this course the student will be able to:

1. Formulate differential equation models of chemical processes using transient material and energy balances.
2. Develop transfer functions from linear and nonlinear models of chemical processes.
3. Create block diagrams and P&IDs for a variety of chemical processes.
4. Analyze the dynamic response of chemical processes in both the time and Laplace domain.

**Major Topics Covered in the Course:** Transient mass and energy balances, Laplace transforms, linearization of differential equations, transfer functions, block diagrams, response of first order, second order and FOPDT systems to typical input changes, approximating models from step tests, modeling systems with SIMULINK, PID controllers, control valves, sensors/transmitters, feedback control loops, P&IDs, introduction to stability and tuning PID controllers.

**Class/Laboratory Schedule:** Two 75-minute lecture sessions per week for 14 weeks.

**Professional Component Contribution:** This is an engineering science/design course.