

Chemical Engineering Department

ChE 405: Chemical Engineering Laboratory 3

Catalog Data: (2 credit hours- 4 contact hours)

(Conducting 6-8 lab experiments focusing on the fundamental concepts taught in the process control course that emphasize the concept of steady and dynamic operations, investigating the dynamic characteristics of chemical processes, and designing a PID controller)

Prerequisite: To be taken with CHE 323

Textbook:

A Manual prepared by the course instructor to be distributed to the students.

References:

1. Seborg, D., Edgar, T., and Mellichamp, D., *Process Dynamics and Control*, Wiley & sons, New York, 1989.
2. Stephanopoulos, G., *Chemical Process Control: An Introduction to Theory and Practice*, Prentice Hall, 1984.

Overall Goal:

This lab is designed particularly to strengthen the process control theory taught in CHE 323 (Instrumentation and Control Course) through direct visualization, observation and implementation of basic feedback control concepts.

1. Developing practical experience.
2. Understanding process dynamics
3. Understanding control loop elements
4. Designing a PID controller

Topics to be covered:

The instructor can choose any 6 experiments out of the following:

- Exp1A: Open-loop dynamic of two interacting storage tanks
- Exp1B: Open-loop dynamics of temperature sensors
- Exp2: Open-loop dynamic of three stirred tanks in series
- Exp3: Open-loop response of tank pressure to step disturbances
- Exp4: Determination of PID Settings for Level Control System
- Exp5: Pressure control using pneumatic Proportional controller
- Exp6: Level automatic control with outflow
- Exp7: Temperature Control System (Test I)
- Exp8: Temperature Control System (Test II)
- Exp9: Temperature Control System (Test III)
- Exp10: Temperature Control System (Test IV)
- Exp11: Pneumatic flow control in gas flow system

Class requirements:

1. Lab reports
2. Written exam
3. Oral presentation

Computer usage: none

Assessment of course goals:

Through lab reports and exams (Lab reports 50%, written exam 20% and oral presentation 30%).

Contribution to professional component:

Mathematics or Basic Science	_____ credits
Engineering Science	_____ credits
Engineering Design	_____ credits

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