

# CONCORDIA UNIVERSITY

## PROCESS DYNAMICS AND CONTROL, ENGR 475 & MECH 605

**Instructor:** Chun-Yi Su  
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**Lecture:** Monday - Wednesday: 14:45-16:00

**Assessment:**

Assignments:	10%
Projects:	10%
Quizes:	30%
Final:	50%

### COURSE OBJECTIVES & OUTLINE

#### Objectives

This is an introductory level graduate course in process dynamics and control. The objective in this course will be to familiarize all students, whether they wish to specialize in process control or not, in classical as well as modern control techniques in the conventional analogue (or continuous-time) and digital computer (or discrete-time) environments. Software platform for assignments and exercises: MATLAB+SIMULINK. Topics to be covered will include all or some of the following.

#### Course Outline

- 1 Introduction (Chapter 1)
- 2 Time domain dynamics (Chapter 2)
- 3 Sampling in control systems. The z-transform and response between sampling instants. Analysis of sampled data systems and stability testing (Chapter 3)
- 4 State-space analysis and design of discrete systems. Controllability, observability and zero input stability analysis (Chapter 4)
- 5 Advanced control systems (Adaptive model-based control, Chapter 5)

#### Assignments and Projects

There will be assignments for both ENGR 475 and MECH 605. These should be submitted for marking within one week of the questions being issued. Most assignments will be the computer simulation of the control of given processes using the SIMULINK toolbox of MATLAB.

ENGR 475 and MECH 605 students will also be required to submit project assignments. These will be announced later.

## **Textbooks:**

I do not recommend that you buy any particular textbook as class notes and handouts should suffice. The following texts are recommended as reference or reading material.

*“Essentials of Process of Control”* by M. L. Luyben and W. L. Luyben, McGraw-Hill, 1997

*“Multivariable Feedback Control: Analysis and Design”* by S. Skogestad and I. Postlethwaite (Wiley)

*“Process Dynamics, Modeling and Control”* by B.A. Ogunnaike and W.H. Ray (Oxford University Press)

*“Process Dynamics and Control”* by D.E. Seborg, T. Edgar and D.A. Mellichamp (Wiley)

*“Modelling of dynamic systems”* by L. Ljung and T. Glad (Prentice Hall)

*“Process Control: Designing processes and control systems for dynamic performance”* by T. Marlin (McGraw-Hill)

*“System Identification”* by T. Soderstrom and P. Stoica (Prentice-Hall)

*“Discrete time control systems (2nd Edition)”* by K. Ogata (Prentice-Hall)