ECHE 550 Chemical Process Dynamics and Control
Fall 2007

Both Sections:	MWF	12:20-1:10	Swearingen 2A31
Lab:	W	1:25-3:20	Swearingen 1D29 or 2A19 or 2A15

Exam: **Wednesday, October 3, 12:20-1:30**
Final: **Thursday, December 13, 5:30**

Instructor:	Ed Gatzke	
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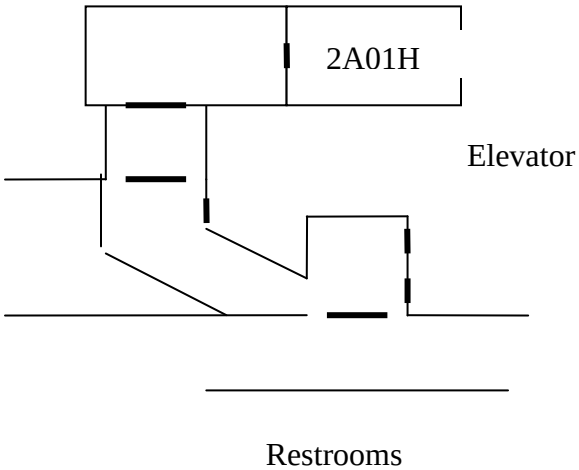
AOL IM:	ed gatzke usc	(Include spaces, only while at work)
Email:	gatzke@sc.edu	(At home or work)
Office:	Swearingen 3C15 . Note: If I am not in my office, I may be:	

- In another faculty office on the second or third floor
- In the office of my graduate students, 2A01H
- In the UO lab, 2A19
- In one of the computer labs 1D29, 3D22
- At lunch, the Strom, or possibly "indisposed"

Official Office hours: Monday, 10:00-11:00, Tuesday, 10:00-11:00

Teaching Assistants:	Alexis Rivera	2A01H
	Timur Alexiev	2A01H

2A01H is difficult to find. On the second floor near the elevator on the southeast side of Swearingen, you should look in the suite across from the restrooms. Enter the suite and head to the left. There is a hallway to a room with graduate students. 2A01H is back past the first big room you come to, back in the corner.



Catalog Description –

550--Chemical-Process Dynamics and Control. (3) (Prereq: grade of C or better in ECHE 300 and MATH 242) Fundamental physical and chemical principles in mathematically modeling the dynamic response of chemical processes; feedforward and feedback control systems; design of control schemes for selected chemical processes.

Objectives –

1. Students will gain the ability to analyze the transient behavior of simple chemical processes.
2. Students will gain the ability to synthesize standard industrial practiced control strategies to cause the system to behave in a prescribed manner.

Goals –

Develop a working understanding of dynamic systems and feedback control, focusing on continuous time linear systems. Topics include the Laplace transform, transfer function representations, model linearization, frequency response analysis, system stability, feedback control, multivariable system analysis, and multivariable control.

Specific Topics –

Develop dynamic mass and energy balance equations
Solve simple linear differential equations using Laplace transforms
Linearize nonlinear differential equations
Analyze stability of transfer functions
Develop and analyze a feedback control schemes

Textbook –

Reading assignments will be provided for most class lectures. Ideally, students should review the topics before coming to class. Students should read the assignments before attempting homework assignments.

Course Textbook – Process Dynamics, Modeling, and Control. B. A. Ogunnaike and W. H. Ray. Oxford University Press, 1994.

Supplemental Textbook – Process Dynamics and Control. Seborg *et. al.* Wiley, 1989.

Supplemental Workbook – Process Control Modules. Doyle *et. al.* Prentice Hall, 1999.

Expectations –

The workload and assignments should require up to 8 hours each week in addition to the 3 hours of class / problem solving and 2 hours of lab. Please let me know if assignments require more time.

Students are expected to give advance notification for scheduled absence from quizzes and exams. A doctor's note is required for unscheduled absences from exams and quizzes. Exams and quizzes will not be made up without proper notification. Late assignments will not be accepted.

Common courtesy is expected in lectures with respect to cell phones, latecomers, and side conversations. Relevant questions and contributions are encouraged during class.

Students are encouraged to work and study in groups. Each individual must turn in distinct homework assignments. Late assignments will not be accepted. Workload for group assignments is expected to be shared among students in the group. Please notify the instructor if a group member fails to adequately contribute to group assignments.

Homework –

Homework is assigned for your benefit to reinforce concepts discussed in class and prepare you for examinations and quizzes. You may consult classmates, but do not blindly copy their solution.

Homework assignments will be graded on a coarse 0-10 grading scale with three possible grades, 0, 5, 10 as following:

0	homework not turned in or mostly incorrect
5	solutions partially correct
10	solutions mostly correct

Please submit your homework at the beginning of class. Solutions will be made available, location TBA.

Use one side of 8½"x11" paper starting each problem on a new page and circling answers. Include a cover sheet including your name and date of submission. Staple your homework in the upper left corner.

Labs –

Laboratory exercises consist of experiments and simulation laboratories. Labs should be straightforward exercises and will be graded on a 0, 5, 10 scale. Groups will receive a grade as a group. Simulation labs will be performed individually unless otherwise noted.

For experimental exercises, you will be divided into groups of 3. One person will be in charge of running the experiment, one person will be responsible for determining the theoretical results/calculations, and one person will be responsible for compiling and writing the report. The group should turn in one report, consisting of the following:

- A one-page executive summary of the experiment and results (5-10 sentences)
- A one-page data sheet

Examinations –

Six short (20 minute) quizzes are scheduled during the semester. One one-hour midterm exam and a final exam are scheduled. All quizzes and exams are open textbook only.

Class Participation –

During lectures, individual or group exercises / discussion topics may be presented. Each student should hand in a written record of these exercises at the end of each class. This will be used to help gauge attendance and class participation. Students can also submit comments and suggestions as course feedback using this written record.

Grading –

Grading mistakes must be submitted for consideration in writing within a week of being returned. Papers submitted for consideration may raise or lower final grade.

Evaluation breakdown

6 Quizzes	5% each
1 Exam	20%
1 Cumulative Final Exam	25%
Homework / Labs / Projects	20%
Class participation	5%

The final grading scale is not fixed. Final letter grade values will be determined at the end of the semester.

Graduate Student Credit – Graduate students can take this class for graduate credit. Graduate student will be expected to provide a written report on a dynamics / control topic related to their area of interest. If you are a graduate student, you must contact me early in the semester to develop a topic for your graduate credit work.