ECHE 550 Chemical Process Dynamics and Control
Fall 2015

Meeting Time:	MF	10:50-11:40	Wardlaw 126
	W	10:50-12:50	Darla Moore 101 OR
			Swearingen 1D11 and 1D29

Exam: Wednesday, October 7, 10:50-11:40
Final: Monday, December 7, 12:30-3:00

Instructor: Ed Gatzke
Swearingen 3C05
Phone: (803) 777-1159 (Rings over to my cell, no text!)
Email: gatzke@sc.edu (At home or work)
For instant messaging try Google Hangouts for messaging: ed.gatzke@gmail.com

Please identify yourself when you message or email me.
Example: "This is Ed Gatzke from ECHE 550."

Office: Swearingen 3C05. Note: If I am not in my office, I may be:

Official Office hours: Tuesday 1:00-2:00, Thursday 3:00-4:00 and by appointment

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.

Goals –

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.

Students should 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.

Suggested Textbook – Process Dynamics, Modeling, and Control. Ogunnaike and Ray.

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

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

MATLAB / Simulink will be used in the computer labs and homework assignments for this course. A student version of MATLAB / Simulink is suggested.

Expectations –

The workload and assignments should require up to 8 hours each week in addition to the 3 hours of class. 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 boxing answers. The first page should include your name and date of submission. Staple your homework in the upper left corner. Multiple page assignments that are not stabled will not be accepted.

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, plot, or figure

Examinations –

Six short (20 minute) quizzes are scheduled during the semester. One one-hour midterm exam and a final exam are scheduled. A single-sided 8½"x11" US letter paper handwritten equation sheet will be allowed for quizzes and exams.

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%
Basic Skills Quiz	up to -20%

Basic skills quizzes will be given on a pass fail basis. If you fail a BSQ, you lose 2% from your total percentage and must take the quiz again until you pass.
The final grading scale is not fixed. Final letter grade values will be determined at the end of the semester. However, the breakdown is often close to "standard", i.e. 90% A, > 85% B+, etc.

Graduate Student and Honors Credit – Graduate students can take this class for graduate credit. Graduate students and students taking this course for honors credit 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 or honors student, you must contact me early in the semester to develop a topic for your graduate credit work.