Catalog Description

Prerequisites
CHME 441

Textbook

Class Schedule
Lecture Meeting Time: Tuesday & Thursday: 8:55AM – 10:10AM
Lecture Meeting Location: GT 337
Recitation: Fridays 5:30PM GT 337

Course Purpose
CHME 412 prepares you for competency in introductory process control so that you are equipped to solve problems that lead to design of chemical processes using control systems and dynamics with simulation in support of the chemical & materials engineering curriculum.

Course Objectives
By the end of the course, you should be able to do the following things:

- **Mathematical Solutions:** solve applied math problems involving linear ordinary differential equations, integration by parts, using partial fraction expansion to perform integration, using Laplace Transforms and building Laplace Transform look-up tables, solve inverse Laplace Transform problems.
- **MATLAB Solutions:** program MATLAB scripts to solve simple mathematics steps related to Laplace Transforms and solving process control systems, simulate open and closed loop processes, implement model-based control.
- **Basic Process Control Concepts and Calculations:** draw and use block diagrams of open and closed-loop transfer functions for control problems; identify control system instrumentation (sensors, transmitters, transducer, final control...
Use process control techniques to address safety concerns; use process control vocabulary appropriately; choose a control strategy for a process; formulate control objectives; identify, formulate and solve linear chemical process dynamics problems; formulate and solve an approximate linear model to a nonlinear process; analyze the stability of a dynamic system

- **PID Control Concepts**: tune a P, PI, or PID controller using control theory; choose the appropriate control action (P, PI, PID) for a particular process,

- **Other topics**: develop process models of non-steady-state process dynamics; identify appropriate loop pairings for multivariable control; identify and implement feedforward and feedback control strategies; implement single-variable controllers (temperature, pressure, concentration, flow, level); and identify advanced control strategies and apply them in appropriate situations (cascade, ratio, pH).

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**Instructor Information**
Jessica P. Houston, Ph.D.
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Department of Chemical & Materials Engineering
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Office Hours: Fridays 2:30 to 3:30 PM
Available also by email or appointment.

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**Policies and Procedures**

*Teaching Assistant:*
Kapil Nichani <kapiln@nmsu.edu> Kapil is a chemical engineering graduate student and will be the TA for this class. Kapil will grade your homework and quizzes substitute for Dr. Houston only if she has to be out. Dr. Houston will grade your exams. Kapil can answer questions related to the course content, about homework, about your homework grades, or anything related to the course. Please email Kapil for availability/office hours/help.

*Grading Point Distribution*

- Exam I (100 points)—20%; Exam II (100 points)—20%; Exam III (100 points)—20%; Final Exam (100 points)—20%
- Homework (100*)—20% Quiz scores will be normalized.

*HW and Quiz scores will be normalized.

**Grading Scale**

- A ≥ 90%; B ≥ 80%; C ≥ 70%  No fractional grading will be given.

**Grading Rubric**

- 10 points - problem solution completely correct
9 points - logic of solution completely correct, numerical error in solution
7 points - slight error in logic of solution, but solution thought through to end
5 points - moderate logic error in solution
3 points - major logic error in solution
1 point – valid attempt, but incorrect logic
no points - no attempt at solution

Make-up Work
Missed quizzes, exams, and homework can only be made up with a valid excuse and within 1 week past due date.

Learn.nmsu.edu
In this class be prepared to use Canvas. Canvas is a website specifically designed for grades, course information and homework assignments; it will be used by Dr. Houston extensively throughout the semester. To access this website go to learn.nmsu.edu. Dr. Houston will upload pertinent class information to the CHME 412 class Canvas site including the syllabus, course calendar, some homework assignments, and your grades. Additionally students might be expected to upload homework and/or other solutions to the Canvas website when they are completed.

Assignment Information

All assignments (homework, quizzes, and exams) are noted in Canvas under the 'Assignments' link for the CHME-412 class. Expect that assignments and/or their due dates are subject to change at any time. When changes occur, they will be announced during the lecture, and sometimes the change may NOT be reflected on our Canvas website! Therefore it is up to you to attend the lecture or verify with Dr. Houston when assignments are due and what content are expected.

Additionally, a course calendar document will be provided through Canvas for you to download. This document is a copy of the due dates and details about each assignment. For example, the calendar will have information about what is to be on each exam, readings to be completed, topics to be covered, how to locate problems, details for class cancellations (i.e. Spring Break), how to turn in homework, expectations on group work, when quizzes are administered, and the time of the final exam. The course calendar will be posted on the Canvas website and will be subject to modification. Refer to the “course calendar” often to be sure you are following the latest version.

All homework assignments are to be uploaded to Canvas by 11:59PM on the day it is due. All homework must be labeled with the student name, problem numbers, date, and ID at the top of the page. DO NOT plagiarize, copy solutions, or allow classmates to blatantly copy your solutions.

Extra Credit
In this course there will be an opportunity for extra credit. Extra credit will be announced in class and considered when assigning final grades.

Withdrawals
Students will not receive an automatic drop for persistent absences or failure to complete assignments. The responsibility for withdrawals is completely up to the student.
Incomplete Grades
If the student is passing this course and has extenuating circumstances that permit him/her from completing the course, a grade of incomplete (I) will be given.

Common Syllabus Addendum:
This syllabus also contains the Department of Chemical & Materials Engineering, Common Syllabus Addendum, that describes Attendance Policy, Disabilities, Misconduct, Re-grades, Student Work Products, Etiquette, Fundamental of Engineering Exam Supplied Reference Handbook, and Video Surveillance. This Common Syllabus Addendum can be found at:
http://chme.nmsu.edu/academics/syllabi/chme-common-syllabus-addendum/