

COURSE SYLLABUS: Chemical Reaction Engineering, Spring 2020

CHE 332 Spring 2020 Chemical Reaction Engineering Tuesday 2-3 pm (Room 427), Thursday 3-5 pm (Room 427) Course website on Moodle	<u>Instructor Contact Information</u> Dr. Amanda Simson Room 418, (212) 353-4373 Email: amanda.simson@cooper.edu Office Hours: Thursday 12:30-1:30 pm Friday 12-1 pm
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Course Description

This course focuses on the design of chemical reactors - batch, semi-batch, plug-flow and combinations of these in series. The design equations for each of these reactors is studied for simple systems and by adding complications due to multiple reactions, non-isothermal operation, and non-isobaric operation. Homogeneous, heterogeneous, catalytic, and membrane reactors are also discussed as are safety considerations for different types of reactions.

Prerequisites: ChE 331 (Thermodynamics II).

Course Objectives

By the end of the course, students should be able to:

1. Distinguish between the main types of reactors and derive the design equation for each of the main types (batch, CSTR, PFR)
2. Use reactor models to calculate conversion for a given reactor, or design a reactor to a specific conversion.
3. Identify potential non-idealities in reactor systems and their effect on the design equation.
4. Determine rate laws from kinetic data.
5. Develop computer simulations for reactors that include pressure effects, temperature effects, and multiple reactions.
6. Create reactor designs that enhance selectivity for a specified product in situations with multiple reactions.
7. Identify safety issues for various reactors and propose methods for hazard prevention or mitigation

Course Format

The format of the course will generally be: initial activity, lecture, followed by problem solving. There are three sections of the course and each will have approximately 1-2 homework assignments and one exam. There will be two midterms and a comprehensive final exam.

Required Text

Elements of Chemical Reaction Engineering, By H. Scott Fogler, Fifth Edition
Pearson Education, 2016.

Additional Resources

- The textbook has a comprehensive website that includes study tools, practice problems and self-tests for studying:
<http://www.umich.edu/~elements/5e/>.
- Additionally, we will use matlab which has resources available for you:
<https://matlabacademy.mathworks.com>
- You may also find helpful youtube resources on [LearnChemE](#)

Course Requirements, Assessment and Administration

Your grade will be calculated as follows:

- Participation and Attendance	5%
- Midterm Exam 1	25%
- Midterm Exam 2	25%
- Comprehensive Final Exam	25%
- Assignments	20%

Exams will be closed book, closed notes. Grades will typically be posted on Moodle.

Attendance and Being Prepared for Class

Attendance can affect your grade. Excused absences must be discussed with the Professor prior to class time except in extreme emergencies. Please note:

- The use of laptops or portable electronic devices in class will not be allowed, unless given specific permission by the instructor. Please speak to me if you would like to use a device during lecture.
- Scientific calculators are useful in class. They will be allowed for exams but the memory must be cleared prior to the test. Standard calculators will be available to use during the exam.

Assignments

Assignments are due on the date assigned at the beginning of the class period (usually via Moodle and **submitted as a pdf**). Homework will frequently be done in pre-assigned groups, with a single assignment per group being graded (at random). Most assignments will require the use of MatLab or Python.

Plagiarism will not be tolerated. According to the Cooper Union course catalog, plagiarism is “the presentation of another persons ‘work product’ (ideas, words, equations, computer code, graphics, lab data, etc.) as one’s own.” This statement also applied to work completed in groups. For homework that includes programming, all students must submit their own individual program.

Special Accommodations

Students with disabilities, or needing special accommodations should meet with me as soon as possible to discuss accommodations.

Learning Environment

I hope all students feel respected and recognized in this course. I also like to create an environment that encourages discussion and participation. Please email me or

Speak to me if there are aspects of the class which are negatively impacting your performance or wellbeing.

Course Outline/Schedule

See attached schedule. Schedule may change - updates will be posted on Moodle. Note the add/drop deadline on January 28th and final exam date on May 2nd.

Prepared by: Amanda Simson, January 15, 2020