

Chemical Reaction Engineering (CBE 3120)
Course Outline- Spring 2017

COURSE DESCRIPTION: Chemical Reaction Engineering is designed to introduce the concepts and applications of reaction kinetics and use this knowledge in conjunction with mass and energy balances to design chemical reactors. The chief objective of this course is to understand the fundamentals of reaction kinetics and apply this knowledge to problems of interest to the chemical engineer. The basis to achieve this objective will be formed through covering topics including fundamental chemical kinetics, mole balances, and reactor design. Once this foundation is developed, more in depth models will be examined while considering multiple reactors, biological reactions, and polymerization.

COURSE LEARNING GOALS:

1. By the end of the course, the student will be able to develop and apply mole balances and basic reaction rate laws to describe chemical reactions.
2. By the end of the course, the student will be able to develop, apply and analyze reactor design equations for batch, continuous stirred tank, and plug flow chemical reactors.
3. By the end of the course, the student will have experience in the analysis of chemical reaction rate data, and the description of multiple reaction systems.
4. By the end of the course, the student will be able to apply concepts of chemical kinetics to advanced topics such as enzyme and polymerization kinetics.
5. By the end of the course, the student will have had opportunities to further his or her professional development through practicing written and oral communication skills.

INSTRUCTOR:

Allan Guymon
Office: Seamans Center Room 4125
Phone: 335-5015
E-mail: Allan-Guymon@uiowa.edu

TEACHING ASSISTANTS:

Bjorn Blomquist
Office Hours- 3:30 – 4:30 pm G138 SC
Recitation Session- 5:30 – 6:30 pm Monday 2217 SC ('Required')
E-mail: Bjorn-Blomquist@uiowa.edu

CLASS: 3505 SC 10:30-11:20 a.m. MWF

Tests tentatively scheduled from 6:30-8:30 pm on 2/21 (2229 SC), 3/30 (40 SH), and 4/26 (2217 SC).

Final: TBD

OFFICE HOURS: 10:30 am – 12:00 pm Thursday 4125 SC

TEXT: Essentials of Chemical Reaction Engineering, First Edition, H. Scott Fogler, 2010 with CD

GRADING:

3 Exams	54%
Final	18%
Project	6%
Assignments	10%
Quizzes	12%

Although grades will be assigned according to a curved scale, students will be guaranteed at least the following grades based on the total points for each of the areas listed above:

90-100%	A
80-90%	B
70-80%	C
60-70%	D
below 60%	F

Exams. All exams may have both open and closed book sections with the emphasis (ca. 60-70%) on the open book section. 3 exams will be given throughout the semester at approximately equal intervals. Each of these exams will be two hours long and given outside of typical class times, most likely on Tuesday, Wednesday, or Thursday evenings. The final exam will be comprehensive and given during finals week.

Homework. Approximately 8-10 homework assignments will be given throughout the semester. Each assignment will be distributed at least one week before the date they are due. These assignments will build on concepts discussed in class and in the book. Students are encouraged to begin assignments early to allow time to ask questions before they are due. Assignments will be collected at the beginning of class on the due date or in the

CBE office by 4:00 p.m as indicated on the homework. Late homework will not be accepted.

In grading homework (and exam) problems, emphasis will be on a correct approach to the problem. Discussion of homework problems with classmates is permitted; however, copying of solutions is not. Homework will be used in two manners: one, all homework will be graded on whether a significant attempt was made at solving the problem for the 10% portion of your grade. In addition, at least one problem per assignment will be graded in detail. If your homework average on these problems is over **85%**, then the lowest exam score (including the final) will be dropped, and the average of your highest three tests will replace your lowest test score! In computing this score, the lowest detailed homework score will be dropped.

Quizzes. Approximately 8-10 straightforward quizzes will be given in class throughout the semester with the lowest score dropped. They will be based on recent lectures and homework. Each quiz will be announced the class period beforehand unless class attendance warrants unannounced quizzes.

Make-up Classes. It may be necessary to hold make-up classes periodically. They will typically be 75 minutes in duration and will be scheduled as needed.

Project. The project will consist of a report and brief presentation on an industrial relevant chemical process. Connections to elements in the course must be included. The report will need to be between 4 and 6 pages (double spaced) with figures. The presentations will be 2 minutes each and given during the last few weeks of class.

Recitation. Attendance for the recitation section is required until the first test is graded. For those with a course conflict or other valid and approved excuse for not attending, attendance at an office hour of the instructor or TA is required. Based on test performance on the first and subsequent tests as announced in class, attendance for some may become optional.

CLASS OUTLINE

- I. Chemical Reaction Kinetics (3 weeks)
- II. Mole Balances and Reactor Sizing (3 weeks)
- III. Reactor Design (3 weeks)
- IV. Multiple Reactions (3 weeks)
- V. Polymerization, Enzyme, and Catalysis Kinetics (3 weeks)