Instructor Information

Instructor: Joel Kaar (Primary)
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Instructor: Christopher Bowman (Secondary)
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Class Times and Information

Lecture: M,W,F 11:30am – 12:20 pm   JSCBB A108
Course Website: https://learn.colorado.edu/
Announcements: Announcements concerning assignments, exams, clarifications of course notes, etc. will be made by email. To ensure you receive announcements, please be sure to check or forward your colorado.edu email accordingly.

Office Hours
Tuesday  2:30 – 5:00 pm   JSCBB B331
Wednesday 2:30 – 5:00 pm   JSCBB B331
Thursday 2:30 – 5:00 pm   JSCBB B115

Course Purpose and Goals

An appreciation of reaction engineering is required to become a chemical or biological engineer. Reaction engineering requires us to use knowledge of the rates of chemical processes to design reactor systems, and they are applicable to many areas of engineering. The increased emphasis on energy utilization and transformation due to increased demand, diminishing supply, and global warming requires the engineers who will solve these problems to have a clear understanding of reaction engineering. Understanding the complex rate behavior of biological systems is also vital in the biotechnology and pharmaceutical industries.
In this course, the basic types of reactors used for a variety of chemical processes will be discussed in detail. Physical factors that control reaction rates and product selectivity will be a focus of the course, as will the engineering of reactor systems to optimize performance. We will discuss the use of biokinetics in applications to pharmacokinetics and fermentation engineering. Connections will be made between the collection of laboratory-scale kinetic data and the design of large scale reactor operations. Finally, we will discuss the use of catalysts to speed up desired reactions, focusing on enzymes and cells, among others.

Prerequisites
CHEN 3010 Chemical Engineering Thermodynamics (minimum grade C-)

Textbook
Required

Supplemental

Course Requirements and Grading Scheme
The breakdown of course grades is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Midterm Exam #1</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam #2</td>
<td>20%</td>
</tr>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes/In-class assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
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Course Policies

Homework
Homework assignments will normally be posted on the course website on Friday and due at midnight on the following Friday unless notified otherwise. Solution sets must be turned in individually, although you may consult your classmates as needed. Homework will not be accepted late except for special circumstances such as cases of illness or travel in which case the student should contact the instructor ahead of the due date to make alternative arrangements. For each assignment, a random subset (~2-3) of the problems will be graded with emphasis on approach rather than final numerical solution. The lowest homework score for the semester will be dropped.

Quizzes
Unannounced quizzes will be periodically given in class throughout the semester. The quizzes are intended to assess your knowledge of the current material, which generally will cover the material from the current or previous week. A total of approximately 5-7 quizzes will be given. Missed quizzes will not be able to be made up. The lowest quiz score for the semester will be dropped.
Exams
The course will consist of two midterms and a final exam. The midterms will be administered as evening exams with one class canceled per midterm to make up for exam being in the evening. Missed exams can be made up in extreme cases only, including, among others, illness, which requires medical attention, travel, death of a family member, or job interview. In such cases, the student must request to make-up the exam at least two weeks in advance when possible and provide relevant corroborating documentation such as a doctor’s note or legal notice. If the reason you miss an exam is unanticipated, you must request to make-up exam within one class meeting after the scheduled exam. As a course policy, if your score on the final exam is higher than your cumulative average on the midterms, your score on the final will replace your cumulative midterm average in determining final grades for the course. The intent of this policy is to provide an opportunity for showing improvement throughout the course as well as a “second chance” to overcome a poor score (including a zero due to a missed exam) on one or more of the midterms. The final exam will be cumulative.

Classroom
It is requested that students make every effort to arrive on-time to class such that class can be started as scheduled without interruption. Also, any discovered incidents of academic dishonesty will be reported to the Academic Dishonesty Committee of the Department of Chemical and Biological Engineering and to the CU Honor Code Council. Consequences will include receiving a failing grade in the course.

Exam Dates
Midterm Exam #1: February 21st (Tuesday), 7:00-9:00 pm
Midterm Exam #2: March 22nd (Wednesday), 7:00-9:00 pm
Final Exam: May 7th (Sunday), 7:30-10:00 pm

University Policies
Honor Code
All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at http://www.colorado.edu/policies/honor.html and at http://www.colorado.edu/academics/honorcode/.

Classroom Behavior
Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of
this preference early in the semester so that I may make appropriate changes to my records. See policies at
http://www.colorado.edu/policies/classbehavior.html and at
http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code.

Disabilities
If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, C4C building, and http://www.Colorado.EDU/disabilityservices. If you have a temporary medical condition or injury, see guidelines at http://www.colorado.edu/disabilityservices/go.cgi?select=3Dtemporary.html. Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at http://www.colorado.edu/disabilityservices.

Religious Holidays
Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, the student must notify the instructor at least one week in advance of a missed class due to religious observance in order to make appropriate arrangements to turn in homework or schedule an alternative time to take an exam. See full details at http://www.colorado.edu/policies/fac_relig.html.

Discrimination and Harassment
The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://www.colorado.edu/odh.