Chemical Process Analysis, CBE 140, Spring 2020
MWF 3:10pm-4pm, 105 North Gate
Discussion (attendance required to one per week):
M, 10:10-11am, B5 Hearst Field Annex
W, 9:10-10am, 587 Barrows

Instructors

Bryan McCloskey, bmcclosk@berkeley.edu, 510-642-2295, 201-D Gilman Hall
Office hours: Tuesdays, 4:00-5:30pm in 201-D Gilman Hall

GSIs: David Brown, demoryb@berkeley.edu
Adrian Davey, adavey1@berkeley.edu
Office hours for GSIs will be announced in class once they have been scheduled.

Description

An introduction to concepts that are necessary to design large-scale chemical processes. Concepts covered are generally related to mass and energy conservation in open and closed systems, both at steady state and in transient operation. An introduction to basics of transport, thermodynamics, and kinetics in the context of reactor, separator, and heat exchanger design.

Course Prerequisite(s)

-Chemical Engineering 40 (Introduction to Chemical Process Analysis)
-Chemistry 1B (General Chemistry) or concurrent enrollment in 4B (Quantitative Analaysis)
-Concurrent enrollment in Physics 7B (Physics for Scientists and Engineers)

Topics to be covered

1. Process flow sheets, process modeling, dimensional analysis
2. Mass conservation in steady-state and transient systems
3. Introduction to reactor design and kinetic models
4. Introduction to equilibrium separations
5. Process economics and optimization
6. Energy conservation in steady-state and transient systems
7. Design of heat exchangers, non-isothermal reactors
8. Chemical and systems safety, runaway reactors

Textbooks

Required:
Elementary Principles of Chemical Processes, 4th Ed. (available as ebook), Richard Felder, Ronald Rousseau, Lisa Bullard, Wiley and Sons, 2019.

Suggested supplemental texts:
-*Introduction to Chemical Processes*, Regina Murphy, McGraw Hill, 2007.
-*Chemical Engineering Design and Analysis: An Introduction*, 2nd Ed., T. M. Duncan, J. A. Reimer, Cambridge University Press, 2018.
-*Chemical Engineering, An Introduction*, Morton M. Denn, Cambridge University Press, 2012.
-All above textbooks are (or will be shortly) on reserve in the Chemistry library

Homework and quizzes

On average, problem sets will be assigned every week. Due to class size and staffing constraints, we may not be able to grade every homework problem on every problem set. Instead, we may grade

only a subset of total assigned problems and your grade will be based on your performance on that subset. You are encouraged to work with your classmates, but you must turn in your own answers and you are responsible for understanding all assigned problems. Work not submitted by lecture on the due date will be considered late and receive no credit. Assignments, partial solutions, and handouts will be posted on the course website. 10-20 minute in-class (lecture only) unannounced quizzes (~5) will be administered throughout the semester to gauge student understanding. Missed quizzes cannot be made up.

Basis for grading:		
	Homework	10%
	Quizzes	15%
	Discussion participation	5%
	Midterms (20% x 2)	40% (tentatively scheduled Fri. 2/28 and Wed. 4/15)
	Final	30% (Wed, 5/13, 7-10pm)

Midterm conflicts

The current tentative schedule for midterms is Fri. 2/28 and Wed. 4/15, likely both 2 hr. exams outside of normal class time. If you have a known conflict with the scheduled midterms, let Prof. McCloskey know as soon as possible. Missing an exam will result in a score of zero unless appropriate documentation for an excused absence is provided. If such documentation is provided, instead of a make up midterm, the missed midterm percentage will be redistributed between the other midterm and final, such that the other midterm will be 30% of your final grade and the final exam will be 40%. The final exam must be taken, no excuses.

Cheating and academic dishonesty

The student community at UC Berkeley has adopted the following Honor Code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." The instructors expect that you will adhere to this code. While working with others on homework problems and during preparation for exams is encouraged, exams and quizzes are individual exercises and may not be completed with help from anyone. Additional rules for exams and quizzes (e.g., open/closed notes or book, cheat sheet allowed, etc.) will be clarified by Prof. McCloskey prior to each. Anyone caught cheating on a quiz or exam in this course will receive a failing grade in the course and will be reported to campus student affairs officials. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.