CBE 40: Introduction to Chemical Engineering Design
Fall 2019

School of Chemical and Biomolecular Engineering, UC Berkeley

Lectures: Wednesday 8:10 - 9 am, 105 Stanley
Discussion Sections: 1.5 hours/week (mandatory)
Instructor: Dr. Negar Beheshti Pour
Contact Info: email, negar.beheshtipour@berkeley.edu; office, 208 Gilman Hall
Office Hours: Wednesday 10-11 am, Monday 12-1 pm (208 Gilman)
Prerequisites: Math 1B OR Chem 4A

Graduate Student Instructors (GSIs) will lead discussion sections. They will announce office hours in your sections and on the bCourse website.

Matthew Dods	mdods@berkeley.edu
Darby Hickson	darbyhickson@berkeley.edu
Victor Miller	vmiller1671@berkeley.edu
Morgan Seidler	morgan_seidler@berkeley.edu
Joshua Hahn	joshhahn@berkeley.edu
Kimberly Chan	kchan45@berkeley.edu
Li Lin	lin603@berkeley.edu

Text: *Chemical Engineering Design and Analysis*, T. Michael Duncan and Jeffrey A. Reimer, Cambridge University Press 1998.

Course Description: CBE 40 introduces process design and analysis. The theme is *chemical engineers design and analyze processes in which physical and chemical changes yield useful products*. Although most chemical processes are sophisticated, they have simple beginnings; designs evolve by adding to and modifying simple ideas. At the end of the semester you will have the tools to design an entire process, analyze the process, and evaluate it from an economic perspective. Though the problems we will encounter encompass a broad range of subfields of chemical engineering, we will use a common approach.

Homework: Assigned on Wednesdays and will be due at approximately midnight on Tuesdays. Homework will be submitted through bCourses as instructed. A 20% penalty will be incurred for homework that is late but submitted within 24 hours of the original deadline. Homework more than 24 hours late will not be accepted.

Questions: Please post your questions about homework and course content on the bCourse discussion board so that all members of the class can benefit from the response. Questions will be answered on weekday evenings. Please do not send e-mails regarding homework or other

course materials as these cannot be answered in a timely fashion. Instead, consult an instructor or GSI during office hours.

Grading: Final course grades will be based on the below criteria and will not be determined on an absolute scale.

Midterm exams	15%
Final exam	20%
Homework	25%
Discussion /Participation /Quizzes	20%
Final Project	20%

Expectations of Academic Integrity and Ethics

We are privileged to participate in the pursuit of knowledge and truth in higher education at UC Berkeley, and students and instructors are expected to maintain academic integrity and an environment of respect for the course of study and one another at all times. Our class is a safe space for people diverse in traits and ideology to exchange ideas and grow in experience and knowledge. Direct any concerns about classroom environment immediately to the instructor.

Cheating: A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on a quiz or exam in this course will receive a failing grade in the course and will be reported. 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.

Plagiarism: Any item submitted by you and that bears your name is presumed to be your own original work. You may use words or ideas of other individuals from publications, web sites, or other sources, but only with proper attribution. "Proper attribution" means that you have fully identified the original source and the extent of your use of the words or ideas of others that you reproduce. To copy text or ideas without proper attribution is plagiarism and will result in a failing grade for your assignment. See the library webpage for additional information on plagiarism and how to avoid it.

Help is available for students

College can be a simultaneously rewarding and challenging experience. To support students in the College of Chemistry, Dr. Yu Bi, a licensed psychologist from UC Berkeley's Counseling and Psychological Services, will be holding office hours in B-52 Hildebrand Hall (entrance is in the elevator lobby off the Breezeway) on Tuesdays to Fridays. If you would like to set up an appointment you may either do so by yu.bi@berkeley.edu or 510-664-7723. Also, at UC Berkeley counseling services are available to you through the Tang Center.

Peer tutoring services are available in Bixby Commons. For more information, see the CoC tutoring web page.

Accommodation of Special Situations and Needs

If you need accommodations related to physical, psychological, or learning abilities, please speak to the instructor after class or during office hours.

If you must miss class because of religious observation, holy day, student-athlete or student-performer commitment, or off-site interview please inform the instructor in writing by the end of the second week of the term in order to plan to submit work early or reschedule an exam. It is your responsibility to review materials outside of class on your own to make up for class time missed. Below are links to important University policies and resources.

1. UC Berkeley Academic Honor Code
2. Accommodation of Religious Creed
3. Conflicts Between Extracurricular Activities and Academic Requirements
4. Absences Due to Illness
5. Accommodation for Disability
6. Accommodation for Pregnancy and Parenting
7. Reading, Review, Recitation (RRR) Week
8. Commencement Ceremonies and Final Exams
9. Accommodation and Support Measures for Sexual Harassment and Sexual Violence
10. Hardship Accommodations

Tentative Course Outline
schedule is subject to change
check the bCourses webpage for current information

Lecture	Date	Topic	Reading (2nd Ed.)	Reading (Old Ed.)
1	8/28	Course introduction Introduction to process design and process flow diagrams	Chapter 1	Chapter 1
2	9/4	Design strategies, unit operations and flow diagram conventions	2.1 (p. 8-19), Appendix B	2.1-2.2 (p. 7-18), Appendix B
3	9/11	Design & separation strategies	2.2-2.4.2 (p. 19-35)	2.3-2.8 (p. 18-37)
4	9/18	Conservation of mass and material balances	3.1 (p. 90-99), Appendix C	3.1-3.6 (p. 61-78), Appendix C
5	9/25	Stoichiometry material balances with reaction, limiting & excess reactants	3.1 (p. 90-99) 3.4-3.4.1 (114-116)	3.1-3.6 (p. 61-78)
6	10/2	Translating physical descriptions to mathematical models, design and operation equations	3.1 (p. 90-99)	3.1-3.6 (p. 61-78)
	10/9	Class and Discussion Section **cancelled** (power outage)		
7	**10/16**	**Midterm (rescheduled)**		
8	10/23	Economics, capital & operating costs, ROI	3.7 (p. 145-156)	3.14-3.15 (p. 95-106)
9	10/30	Conservation of energy, heat capacity	3.5 (p. 117-132)	3.7-3.13 (p. 78-95)
10	11/6	Assignment and discussion of final project; technical communications	Background for final projects	
11	11/13	Phase diagrams	4.1.1(p. 243-247) 4.1.3 (253-262) 4.2.1-4.2.2 (p. 267-277), Appendix D	4.1-4.6 (p.139-167), Appendix D
12	11/20	Separations and graphical analysis: flash drums	4.2.3-4.2.4 (p. 283-289)	4.7-4.9 (p. 167 – 186)
	11/27	**Non-Instructional Day**		
	12/4	Alumni guest panel **Final project presentations** in discussion sections		
	12/11	**No class – RRR** review during discussion sections		
	12/16	**Final Exam 7 – 10 pm**		