

Chemical Engineering 40
Introduction to Chemical Engineering Design
Spring 2020 Syllabus

2 Units

Lectures: Tuesday 8:10 - 9 am, 2040 Valley Life Science Building

Discussion sections: 1.5 hours/week (mandatory)

101	Tuesday	12:30-2:00	3109 Etcheverry
102	Tuesday	2:00-3:30	175 Barrows
103	Thursday	12:30-2:00	202 Wheeler
104	Thursday	5:00-6:30	283 Dwinelle

Faculty Instructor: **Dr. Shannon Ciston** sciston@berkeley.edu
Office Hours 101-A Gilman Hall
ChemEng 40 only: Thursdays, 2:30-3:30 pm
All Students: Tuesdays, 10:30-11:30 am and Wednesdays, 9:45-10:45 am

Graduate Student Instructors (GSIs) will lead discussion sections:

Lorena Grundy (Tuesday sections 101, 102) lgrundy@berkeley.edu
Office Hours: 775B Tan Hall on Mondays, 3:00-4:00

Elyse Kedzie (Thursday sections 103, 104) kedzie@berkeley.edu
Office Hours: 425 Latimer Hall on Fridays, 12:00-1:00

Note: Some office hours sessions will be held in an alternate room. Please watch for course announcements.

Text: *Chemical Engineering Design and Analysis: An Introduction*, **second edition**, T. Michael Duncan and Jeffrey A. Reimer, Cambridge University Press 2019. **ISBN-13:** 978-1108421478

Course Description: ChemEng 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 Tuesdays and due online on Monday night at 11:00 pm as one file uploaded to bCourses Assignment. Late homework is subject to a 30% per day penalty, defined as 30% penalty for assignments up to 24 hours late, 60% penalty for assignments between 24 and 48 hours late, 90% penalty for assignments between 48 and 72 hours late.

Grading:

Homework	20%
Discussion, Participation, and Quizzes	20%
Midterm	20%
Final Project	20%
Final Exam	20%

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Questions: Please post your questions about homework and course content on the piazza discussion board (**Class Link:** piazza.com/berkeley/spring2020/cbe40/home) 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.

Piazza Discussion Board Guidelines:

This is a platform for discussing course material and logistics for Chemical Engineering 40 course at UC Berkeley, and related matters such as the chemical engineering discipline and careers. The choice to host a forum-based communication platform is for value-added discussions and the opportunity to answer questions in a way that can be shared among the community. It also creates an organized and searchable database of questions and answers.

To make this forum the best it can be:

Please be respectful of your peers and others in your posts. The boards will be regularly monitored to maintain this community standard.

If you have information or resources to share, you can respond to polls and discussions, either publicly or privately, either anonymously or identified. The instructor will endorse good answers.

Remember that people learn how to do engineering analysis and design through repeated practice, and that some confusion or struggle along the way is normal and necessary for lasting learning.

Please respect the learning process for all involved, specifically by refraining from giving the answer outright. Numerical steps along the way to the final answer are also discouraged. Please keep your discussion about things like:

Clarifying the language or nature of the question

Pointing to helpful resources (such as material properties tables)

Giving a helpful "hint" to point others in the right direction for the solution approach

Please link to other relevant posts with the @ function ([@73](#) to link to the 73rd post).

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.

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.

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

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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, image, 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.

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, or as soon as possible, in order to make arrangements 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](#)

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 B40/40A Hildebrand Hall on Tuesdays to Fridays. You can make an appointment by contacting her at 510-664-7723 or drop-in on Tuesday afternoons 2-4pm and Friday mornings 10am-12pm. Also, at UC Berkeley counseling services are available to you through the Tang Center, <https://uhs.berkeley.edu/counseling>.

Peer tutoring services are available in Bixby Commons. For more information, see the [CoC tutoring web page](#).

Drop-in Hours with Director of Undergraduate Education, Dr. Ciston

Ask questions about course planning, opportunities, and more: Tuesdays, 10:30-11:30 am and Wednesdays, 9:45-10:45 am. Gilman 101-A

If you would like to talk about a personal matter confidentially, you are always welcome to make an appointment to see Dr. Ciston.

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

Lecture	Date	Topic	Lecture preparation reading from D&R
1	21-Jan	Course introduction Introduction to process design and process flow diagrams	Chapter 1
2	28-Jan	Design strategies, unit operations and flow diagram conventions	Sections 2.1-2.2 (p. 8-24), Appendix B
3	4-Feb	Design & separation strategies	Sections 2.3-2.5 (p. 25-47)
4	11-Feb	Conservation of mass and material balances	Sections 3.1-3.4 (p. 89-117), Appendix C
5	18-Feb	Stoichiometry, material balances with reaction, limiting & excess reactants	Sections 3.2-3.4 (p. 99-78)
6	25-Feb	Translating physical descriptions to mathematical models, design and operating equations	Sections 3.1-3.6 (p. 89-145)
	3-Mar	Midterm	
7	10-Mar	Economics, capital & operating costs, ROI	Sections 3.7 (p. 145-155)
8	17-Mar	Conservation of energy, heat capacity	Sections 3.5-3.6 (p. 117-145)
	24-Mar	No class – Spring Break (No discussion sections this week)	
9	31-Mar	Assignment and discussion of final project; technical communications	Background for final projects
10	7-Apr	Tie Lines, Mixing Lines, and the Lever Rule; Operating Lines for Two-Phase Systems	Sections 4.1-4.2 (p. 243 – 288), Appendix D
11	14-Apr	Pure Component Phase Diagrams	Section 4.3 (p. 289 – 301)
12	21-Apr	Dimensional Analysis	Sections 5.1-5.3 (p. 423 – 459)
	28-Apr	Alumni guest panel	
	21-Apr-30-Apr	Final Project Presentations in discussion sections	
	5-7 May	No class – RRR review during discussion sections	
	14-May	Final Exam 7 – 10 pm	