

**CBE 40**  
**Introduction to Chemical Engineering Design**  
**Fall 2020 Syllabus**

**2 Units**

**Lectures:** Wednesday 1:10 – 2:00 pm (**remote via Zoom and recorded**)

**Discussion sections:** 1.5 hours/week (**remote via Zoom and recorded**)

**Instructor:**

**Dr. Marjorie Went**

[mwent@berkeley.edu](mailto:mwent@berkeley.edu)

**Zoom Office Hours**

CBE 40 only: Tuesdays 9:10 – 10:30 am

Open: Fridays 10:10 – 11:00 am

**Graduate Student Instructors (GSIs)** will lead discussion sections and be part of all aspects of the course. They will announce office hours on the bCourse website.

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**Textbook:** *Chemical Engineering Design and Analysis*, T. Michael Duncan and Jeffrey A. Reimer, Cambridge University Press (Second Edition, 2019) ISBN 978-1-108-42147-8

**Webpage:**

Our course will be using bCourse. You will find all course information and assignments there.

**Remote instruction:**

Lectures and discussion sections will be held at the regularly scheduled time via Zoom. Synchronous attendance will *not* be mandatory but we ***strongly encourage you to attend the live lectures and the live discussion sections if you can.*** Dr. Went believes that learning is an active process. Be prepared for opportunities to converse with your peers during the class time. We plan to use the “Chat” and “Breakout Room” features of Zoom to enable questions and answers between students and instructors and to facilitate smaller group conversations. We will be frequently asking you to answer questions, respond to prompts or briefly summarize lecture or discussion section content. We will give occasional quizzes. We will at times ask you to submit written responses online, whether you attend lecture synchronously or not, within 24 hours of the scheduled class. These Answers, Summaries, and Prompts (ASAPs) will be part of your grade (see below.)

We will endeavor to post all lecture and discussion section recordings and notes on bCourse, barring technical difficulties, following the live sessions. If you object to being recorded, you may at any time refrain from participating visually, verbally, or in the “chat”.

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Because of the nature of online instruction, we expect you to diligently read or view the material assigned before class and come prepared to delve deeper into understanding the topic. Less material will be covered through delivery with more opportunities to learn experientially and through examples.

At the start of the semester we will send you a survey in which we will ask if you have any circumstances that prevent you from attending lectures in general or on any specific day. We will also ask if you need extra support with technology that will enable you to participate in remote learning or with access to course materials, and if you have trouble accessing a functional workspace free of distractions. Our policy will be to incorporate flexibility regarding deadlines and accommodations, but ***the responsibility for communicating special circumstances is on you, the student.***

***The remote classroom will be a safe place where all participants are expected to treat each other with respect and courtesy.***

**Homework:**

Problem sets will be assigned on Wednesdays and due online the following Wednesday **before** lecture begins. See "Homework Guidelines". We will use Gradescope and Turnitin for grading problem sets, quizzes and ASAPs, exams and the final project.

**Questions:**

Please post your questions about homework and course content on the bCourse discussion forum so that all members of the class can benefit from the responses. Instructors will answer questions within 24 hours on weekdays. 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:**

Homework	approx. 30%
Quizzes and ASAPs*	approx. 20%
Midterm	approx. 12%
Final Project	approx. 20%
Final Exam	approx. 18%

\* *ASAPs are Answers, Summaries, and Prompt responses submitted online as part of lectures and discussion sections.*

Final course grades will be based on the above criteria and will not be determined on an absolute scale. We assign letter grades A, B, C, with + and -, and D or NP.

**Course Description:**

CBE 40 introduces process design and analysis. The theme is: *Chemical engineers design and analyze processes in which physical and chemical transformations 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 mass and energy flows within 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.

**Expectations of Academic Integrity and Ethics:**

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We are privileged to participate in the pursuit of knowledge and truth in higher education at UC Berkeley, where 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 transition to remote instruction means that exams will not be proctored in person and obviates the need for each member of our learning community to commit fully to the Honor Code. The instructors expect that you will adhere to this code without fail. *Anyone caught cheating on a quiz or exam, including working with a peer where individual work was specifically required, will receive a failing grade in the course and will be reported.*

**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.

**Accommodation of Special Situations and Needs:**

If you need accommodations related to physical, psychological, or learning abilities, please make an appointment to speak to the instructor so we can determine how to best support your needs.

If you normally attend class synchronously but must miss a lecture or discussion section because of religious observation, holy day, or other obligation, please inform the instructor by the end of the second week of the term to arrange 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. [Hardship Accommodations](#)
10. [Accommodation and Support Measures for Sexual Harassment and Sexual Violence](#)

**Help is available for students:**

College can be a simultaneously rewarding and challenging experience. To support students at UC Berkeley counseling services are available to you through the Tang Center:

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<https://uhs.berkeley.edu/counseling>.

<https://uhs.berkeley.edu/coronavirus/student-mental-health>

In addition, help is available for students requiring extra assistance with basic needs and with technology during the COVID-19 pandemic:

[UC Berkeley Basic Needs Center](#)

[UC Berkeley Student Technology Fund](#)

**Peer tutoring** services for the College of Chemistry are available online. For more information, see the [CoC tutoring web page](#).

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

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**Tentative Course Outline**  
*Schedule is subject to change - check bCourse for current information*

Lecture	Date	Topic	Lecture preparation reading from D&R, 1 <sup>st</sup> ed.	Lecture preparation reading from D&R, 2 <sup>nd</sup> ed.
1	Aug 26	Course introduction Introduction to process design and process flow diagrams	Chapter 1	Chapter 1
2	Sept 2	Design strategies, unit operations and flow diagram conventions	Sections 2.1-2.2 Appendix B	Section 2.1-2.2 Appendix B
3	Sept 9	Design & separation strategies	Sections 2.3-2.8	Sections 2.3-2.5
4	Sept 16	Conservation of mass and material balances	Sections 3.1-3.6; Appendix C	Section 3.1 Appendix C
5	Sept 23	Stoichiometry, material balances with reaction, limiting & excess reactants	Sections 3.1-3.6	Sections 3.2, 3.3
6	Sept 30	Translating physical descriptions to mathematical models, design and operating equations	Sections 3.14-3.15	Sections 3.4
	<b>Oct 7</b>	<b>Midterm</b>		
7	Oct 14	Economics, capital & operating costs, ROI	Sections 3.14-3.15	Section 3.7
8	Oct 21	Conservation of energy, heat capacity	Sections 3.7-3.13	Sections 3.5, 3.6.1
9	Oct 28	Phase diagrams, flash drums	Sections 4.1-4.6; Appendix D	Section 4.1.1-4.1.3; 4.3 Appendix D
10	Nov 4	Separations and graphical analysis: multi-phase systems	Sections 4.7-4.9	Sections 4.2.3-4.2.4
11	<b>Nov 11</b>	<b>Holiday: No lecture</b> Assignment and discussion of final project, technical communications covered in discussion sections	Background for final projects	Background for final projects
12	Nov 18	Heat transfer and dimensional analysis	Sections 5.1-5.4 (optional)	Sections 5.1-5.2 (optional)
	<b>Nov 23 - 27</b>	<b>Thanksgiving holiday:</b> No lecture or discussion sections this week		
13	Dec 2	Alumni guest panel		
	<b>Nov 30 - Dec 4</b>	<b>Final Project Presentations</b> in discussion sections		
	<b>Dec 7 - 11</b>	<b>No class - RRR review</b> during discussion sections		
	<b>Dec 16</b>	<b>Final Exam 7 - 10 pm</b>		