Chemical Engineering 150B
Transport and Separation Processes
Fall Semester 2020
Course Website: http://bcourses.berkeley.edu

Instructor: Alexis T. Bell (alexbell@berkeley.edu)
Office Hours: Tu 2:00–3:00 pm, Th 1:00–2:00 pm

Teaching Assistants: Muhimbo Karangizi (mdkarang@berkeley.edu)
Office Hours: Mon 12:00-1:00 pm
                 Fri   10:00-11:00 am
Triesha Singh (triesha_s@berkeley.edu)
Office Hours: Mon 1:00-2:00 pm
                 Wed 3:00-4:00 pm

Discussion Sections: Discussion Sec. 101: M, 3 pm-4 pm
Discussion Sec. 102: Tu, 11 am-12 pm
Discussion Sec. 103: Th, 11 am-12 pm
Discussion Sec. 104: F, 1 pm-2 pm

Lecture Hours: MWF, 2:00 pm – 3:00 pm

Texts: J. R. Welty, C. E. Wicks, R. E. Wilson, G. Rorrer, Fundamentals of Momentum, Heat, and Mass Transfer, Fifth Edition, John Wiley & Sons, Hoboken, NJ, 2008.

J. D. Seader, E. J. Henley, and D. K. Roper, Separation Process Principles, Fourth Edition, John Wiley & Sons, Hoboken, NJ, 2016.

Course Grade: The course grade will be determined by the following:

Homework:	15%	
Lecture Summaries:	10%	
Midterm Exam 1:	25%	(October 9)
Midterm Exam 2:	25%	(November 13)
Final Examination:	25%	

Homework: Homework will be assigned on Wednesdays, posted on bocurses that day. And will be due by noon on the following Wednesday, unless indicated otherwise. Four to five problems will be assigned each week. Solutions will be posted on the class website. The homework should be scanned and submitted through bCourses as a .pdf or jpeg. file. Evernote Scannable, a free scanning app for iPhone and Android can be used for this purpose. Please contact the GSIs if you have any trouble.

In case you are not able to submit the homework file on time due to last-minute technical issues, you must follow the following instructions.
1. Do not modify the file after the submission deadline.
2. You must, along with the homework, submit a recording of your screen (either using a Screen-Record app or using any other device). This recording should display the following (in any order):
 a. The date and time (of the PC/laptop/iPad/tablet, from whichever device you are accessing the browser to submit the assignment) at which the recording is being taken.
 b. The date and time the file was 'last modified'.

c. The process of uploading the file on bcourses.
Once the homework has been submitted, you can end the recording. The video can be sent to either of the GSIs via email.

Computer Use: Students will be expected to use computers to solve some of the homework assignments. CBE will be hosting the software COMSOL, ASPEN, and MATLAB on UCB servers so that you may use this software remotely. For those students on campus, the Chevron computing facility will be open (but subject to public health social distancing and occupancy density limits).

Grading Policies: 1. Homework must be turned in at the designated time. Late problem sets will be corrected but assigned a score of zero.
2. Students should feel free to discuss the homework assignment with others; **however, the final product must be entirely your own work**.
3. Requests for homework regrades can be made at the end of the course and will be taken into consideration when determining the final course grade.
4. Exams will not be given early or late. If you miss an exam for a valid reason, your scores from other exams will be averaged to make up for the missed exam. Missing more than one exam will result in either an F grade for the course. Missing an exam without a valid reason will result in a zero grade for that exam. Requests for exam regrades, if approved, will require the entire exam to be regraded (select portions will not be regraded).

References: Students may find additional reference material in helpful for either offering an alternative explanation of course material already in the textbook or more a more in-depth discussion of certain aspects of this material.

A more specialized text dealing with mass transport is:
E. L. Cussler, Diffusion: Mass Transfer in Fluid Systems, Second Edition, Cambridge University Press, Cambridge, United Kingdom.
Chemistry Library TP 156.D47.C878 1997 Reference

A text with good discussion of unit operations for separations and their design is (students may find this text less specialized than the Seader and Henley text for many aspects):
R. E. Treybal, Mass-Transfer Operations, Third Edition, McGraw-Hill Book Company, New York.
Course Reserves Section in Chemistry Library TP156.M3.T7 1980

A text with good discussion of unit operations in general is:
C. J. Geankoplis, Transport Processes and Separation Process Principles (Including Unit Operations), Fourth Edition, Prentice Hall, Upper Saddle River, New Jersey.
Chemistry Library TP156.T7.G4 2003 Reference

Alternative discussion on separations and mass transport can be found in:
A.L. Hines and R. N. Maddox, Mass Transfer: Fundamentals and Applications, 1985, Prentice Hall, Upper Saddle River, New Jersey.
Course Reserves Section in Chemistry Library TP 156.M3.H55 1985

Additional Information

Remote instruction:
Lectures and discussion sections will be held at the regularly scheduled time via Zoom. ***Zoom links for these events and for the office hours of the instructional staff can be found on the bcourses site for the course.***

Synchronous attendance will *not* be mandatory but we ***strongly encourage you to attend the live lectures and the live discussion sections, if you can***. Prof. Bell 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 occasionally ask you to summarize the material that will be covered in the next lecture. Your answers to the questions posed should be based on your reading of the assigned text. Your responses will be graded (see above).

We plan 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".**

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 through discussion of 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.***

Below is a link to technology aids for students.

https://technology.berkeley.edu/COVID-19

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.

Expectations of Academic Integrity and Ethics:
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:

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

Fall Semester 2020 Class Schedule

Date	Lecture №	Topic	Chapter
08/26	1	Fundamentals of Mass Transfer	24 in W³R
08/28	2	Differential Equations of Mass Transfer	25 in W³R
08/31	3	Diffusion Coefficients	24 in W³R
09/02	4	Steady-State Molecular Diffusion	26 in W³R*
09/04	5	Steady-State Molecular Diffusion	26 in W³R
09/07	--	Labor Day Holiday	--
09/09	6	Steady-State Molecular Diffusion	26 in W³R*
09/11	7	Unsteady-State Molecular Diffusion	27 in W³R
09/14	8	Unsteady-State Molecular Diffusion	27 in W³R
09/16	9	Convective Mass Transfer	28 in W³R *
09/18	10	Convective Mass Transfer	28 in W³R
09/21	11	Convective Mass Transfer	28 in W³R
09/23	12	Convective Mass Transfer between Phases	29 in W³R *
09/25	13	Convective Mass Transfer between Phases	30 in W³R
09/28	14	Simultaneous Heat and Mass Transfer	26 in W³R
09/30	15	Simultaneous Heat and Mass Transfer	26 in W³R *
10/02	16	Separation Processes	1 in SH
10/05	17	Thermodynamics of Separation Processes	2 in SH
10/07	18	Thermodynamics of Separation Processes	2 in SH
10/09	--	First Midterm Examination	--

Date	Lecture №	Topic	Chapter
10/12	19	Single Equilibrium Stages and Flash Calculations	4 in SH*
10/14	20	Single Equilibrium Stages and Flash Calculations	4 in SH
10/16	21	Absorption and Stripping Operations	6 in SH
10/28	22	Absorption and Stripping Operations	6 in SH*
10/21	23	Absorption and Stripping Operations	6 in SH
10/23	24	Distillation of Binary Mixtures	7 in SH
10/25	25	Distillation of Binary Mixtures	7 in SH*
10/27	26	Distillation of Binary Mixtures	7 in SH
10/30	27	Distillation of Binary Mixtures	7 in SH
11/02	28	Liquid-Liquid Extraction	8 in SH*
11/04	29	Liquid-Liquid Extraction	8 in SH
11/06	30	Liquid-Liquid Extraction	8 in SH
11/09	31	Equilibrium-Based Multicomponent Separations	10 in SH*
11/11	--	Administrative Holiday	--
11/13	--	Second Midterm Examination	--
11/16	32	Equilibrium-Based Multicomponent Separations	10 in SH
11/18	33	Equilibrium-Based Multicomponent Separations	10 in SH
11/20	34	Membrane Separations	14 in SH*
11/23	35	Membrane Separations	14 in SH
11/25	--	Non-Instructional Day	--

Date	Lecture №	Topic	Chapter
11/27	--	Administrative Holiday	--
11/30	36	Adsorption	15 in SH
12/02	37	Adsorption	15 in SH*
12/04	38	Course Review	--
12/07	-	Reading Review and Recitation	--
12/09	-	Reading Review and Recitation	--
12/11	-	Reading Review and Recitation	--

* Indicates homework is due on this day