

ChE-310: Fundamentals of Separation Processes

Instructor

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Guest Lecturer

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Teaching Instructors

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Classroom

CM 0 11

Lecture videos will be posted on Moodle. Students are expected to review the recording before attending the lecture.

Meeting time (Wednesday)

Lecture: 9h15 – 11h00 (Students should use the time between 9h15 and 10h00 to review the posted lecture videos further if they did not have time before). Discussions with the instructor will commence between 10h00 and 11h00.

Exercise with TAs: 11h15 – 12h00

Moodle Site

Course information, including the syllabus, lecture notes, recorded lecture videos, and announcements, can be found at the Moodle site.

<https://moodle.epfl.ch/course/view.php?id=15847>

Summary

Students will learn the fundamental concepts related to molecular separations in industrial processes. Students will employ these concepts to design equilibrium-stage and rate-limited processes for separating homogeneous mixtures.

Intended Learning Outcome

By the end of the course, students should be able to

- Use of energy separating agent (ESA) and mass separating agent (MSA) for separating chemical mixtures.
- Calculate the composition of streams leaving a separation process using the concepts of mass and energy balances, phase equilibria, mass transfer, and diffusion.
- Design equilibrium-stage separation process (number of stages, concentration of streams entering or leaving the processes) for the desired outlet concentration from a given feed.

Course Content

Mass and Energy Balances

Thermodynamics of Separations/Phase Equilibria/Degree of Freedom

Flash Distillation

Column Distillation

Multicomponent Distillation

Absorption and Stripping
Liquid-Liquid Extraction
Diffusion and Mass Transfer
Adsorption Processes
Membrane Processes

Textbooks

Separation Process Engineering by P. C. Wankat (available online in the library)
Separation Process Principles by J. D. Seader, E. J. Henley, D. K. Roper

Teaching Method

1. Links to recorded lecture videos, as well as complete lecture notes will be posted on Moodle. Students are expected to review these videos before the class. The class will then mainly discuss questions/clarifications with these videos, with the possibility of additional in-class exercise problems.
2. All videos are available at <https://mediaspace.epfl.ch>. Go to EPFL Courses, then Chemical Engineering - ChE. Here you can find the folder for ChE-310 Fundamentals of Separation Processes.
3. An exercise session led by the TAs will be held during the last hour of the lecture.
4. Your smartphone would be used to conduct quizzes (usually multiple-choice questions). These quizzes are meant to support the learning process. For example, questions would be asked at the start of every class to gauge understanding of the subject and review concepts. Your responses would be anonymous. Answers will not be used for formal assessment.
5. To participate in quizzes using smartphone, you can open the URL <http://tppoll.eu>

Then add che310 as the session id.

Ed Discussion Forum

Questions/discussions on the concepts, in-class exercises and homework problems can be discussed on this forum. It can be accessed via Moodle. I encourage you to ask questions when you struggle to understand a concept—you can even do so anonymously.

Post your questions in the forum instead of emailing me or TAs directly. Think of it as a Q&A wiki for the class.

Grades

1. **Homework** (total 3, 24% of the total grade). They will comprise 2-3 questions focused on the key concepts. Homework will be posted on Moodle. Students are expected to submit the homework on Moodle before the deadline. Homework submitted after the deadline will not be considered. Clarifications for homework problems can be posted on the Ed Discussion forum under the relevant homework folder.
2. **Mid-term written exam** (26% of the total grade): In April, during the course hours (9h15 to 12h00). The exact date will be announced 1-2 weeks before the exam. The type of questions in the exam will focus on the concept taught in the course.

3. **Final written exam** (50% of the total grade) during the exam session. The type of questions in the exam will focus on the concept taught in the course.