

ChE-310: Fundamentals of Separation Processes

Instructor

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Teaching Instructors

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Classroom

CHB 331

Meeting time

Monday, 3 – 6 PM

13 lectures

Moodle Site

Course information including the syllabus, pre-lecture readings, lecture notes and announcements can be found at the Moodle site.

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

Summary

Students will learn the fundamentals concepts related to molecular separations in industrial processes. Students will employ these concepts to design equilibrium-stage and rate-limited processes for the separation of homogeneous mixture.

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 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 Principles by J. D. Seader, E. J. Henley, D. K. Roper

Separation Process Engineering by P. C. Wankat (available online in the library)

Teaching Method

1. Projector slides would be used to deliver the course content. Examples and exercise will be conducted in between the lecture. For problems using graphical approach, graph papers would be provided but students are expected to bring their own pencil, rulers, etc.
2. In addition, a process simulator, Aspen Plus, will be used to illustrate the concepts, inferring the governing principles. Students are NOT expected to know Aspen Plus a priori. The use of Aspen plus will be restricted to illustrate the concepts by the instructor.
3. Clickers (device that allows you to answer interactive questions in class) would be used to conduct quizzes (usually multiple choice questions). These quizzes are meant to support the learning process. For example, clicker based question would be asked at the start of every class to gauge understanding of the subject and review concepts. Clicker responses would be anonymous. Answers will not be used for formal assessment.
4. To be able to participate in this, you can use your smartphone/tablet to answer questions. You will have to install the 'TurningPoint' app on your smartphone (Android or iOS). You can find the details here:

*<https://play.google.com/store/apps/details?id=com.turningTech.Responseware&hl=en-ca>
<https://itunes.apple.com/us/app/turningpoint/id300028504?mt=8>*

5. Clickers will be distributed in the first class, and students are responsible to bring them to every lecture. Student borrowing the clickers must return them in the last class of the semester. Students are responsible for getting assistance in case of technical issues (for example, low battery). Clickers can also be borrowed from the library. To borrow a clicker, visit the Library main counter at the Rolex Learning center (Mon-Fri, 8 AM to 8 PM). The loan is free of charge and the only thing you need is your CAMIPRO.

Grade

1. 1st in-class exam (20%) - March 25 (timing can change)
2. 2nd in-class exam (20%) – May 6 (timing can change)
3. Final written exam (60%)

About in-class exam: We will have 2 short exams during the semester during the scheduled lecture hours in the classroom. These exams will be typically 60-90 minutes long. The tentative schedule is mentioned above. The exact schedule will be announced in class.