

CHBE 3225 Separations Processes (required course)

Credit: 3-0-3

Instructor: Yonathan S. Thio

Textbook: J.D. Seader, E.J. Henley, D.K. Roper, *Separation Process Principles*, Wiley, 3rd edition, J. Wiley & Sons Inc., New York, 2011

Catalog description Fundamentals of equilibrium-stage and continuous contacting operations. Applications of principles to distillation, absorption/stripping, extraction, absorption, and other separation technologies.

Pre-requisites: ChBE 3200, (ChBE 3110 or ChBE 3130), both courses with a minimum grade of "C". ChBE 3210 is a required co-requisite.

Learning Outcomes: By the end of this course, a student should be able to:

1. Calculate the properties (e.g., compositions and flow rates) of product streams, as well as energy requirements, for single-stage operations such as flash tanks. (Student Outcomes a, c, e, k)
2. Identify separations equipment of various types and their components. (Student Outcomes e, h, i, k)
3. Design multistage separation systems for specific operations involving distillation, absorption, stripping, extraction/leaching, crystallization. (Student Outcomes a, b, c, e, k)
4. Calculate the properties of membrane units for separations. (Student Outcomes a, b, c, e, k)
5. Understand the design fundamentals for bioseparations. (Student Outcomes (a, b, c, e, j, k)
6. Use computer modeling to design and simulate complex separation systems. (Student Outcomes a, b, c, e, h, j, k)
7. Evaluate competing separation technologies on factors such as simplicity, reliability, and cost. (Student Outcomes a, b, h, j)

Topical Outline

1. Introduction: overview and review of thermodynamics and transport
2. Single-stage separations
3. Separation cascades
4. Liquid-liquid extraction
5. Absorption and stripping
6. Distillation
7. Membrane separation
8. Reverse osmosis
9. Solid particle separation
10. Crystallization
11. Adsorption

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