CHEN 4820 – Bioseparations

Textbook: *Separation Process Principles* by Seader and Henley (Wiley), supplemented with "Bioseparations Engineering" by Michael Ladisch (Wiley)
3 credits engineering topics: three one-hour lectures

Learning Goals

1. Vapor-Liquid Equilibrium

- Skills in graphical means to represent binary equilibrium
- Knowledge and use of analytical (equations) means to represent ideal and nonideal equilibrium

2. Flash Distillation

- Ability to analyze flash distillation problems using graphical methods, analytical methods implemented on spreadsheets, and commercial process simulations such as HYSYS

3. Distillation Column

- Skills in graphical methods for analyzing distillation problems as well as the use of commercial process simulators for the analysis
- (Ability to calculate column diameters and tray spacing using commercial simulators for both tray and packed columns) Delete

4. Absorption and Extraction

- Ability to analyze absorption and extraction problems graphically and using commercial simulations

5. Mass Transfer Rate Processes

- Understanding of the fundamentals of diffusion
- Ability to develop microscopic material balances for mass transport processes
- Knowledge of definitions and means for correlating mass transfer coefficients

6. Packed Columns

- Ability to apply mass transfer rate theory to the design of packed columns using graphical and commercial simulators

7. Membrane Separations

- Ability to analyze batch and continuous processes of microfiltration, ultrafiltration, dialysis, pervaporation, and reverse osmosis

8. Biological Separation Techniques

- Ability to analyze adsorption, ion exchange, chromatography including solvent gradients, displacement and affinity bindings.

Catalog Description: (This is the catalog description for the current Separations course. What will be removed from the current Separations course?) Studies separation methods including distillation, absorption, extraction, membrane and chromatographic separations. Develops graphical and computer-based solutions to separation problems. Also studies mass transfer rate processes, including diffusion, microscopic material balances, and correlations for mass transfer coefficients. Applies mass transfer rate theory to packed bed columns of adsorption and chromatographic separations. *Proposed* prereq., CHEN 3200, CHEN 3320, and CHEN 2810 or MCDB 1150. Coreq., CHEN 3210 or MCEN 3022.

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