

ENCH 445: Separation Processes

Instructor: Professor Doug Frey, TRC 252B, 455-3418; dfrey1@umbc.edu;
Office hours: after class Tuesdays and Wednesdays (tentative), or by appointment.
Textbook: *Separation Process Engineering, 2nd Ed.* by P. C. Wankat
Course Website: <http://research.umbc.edu/~dfrey1/ench445/>
Course Listserver: ench445@listproc.umbc.edu
Grading: Two midterms: 40%; Final: 40%; Homework: 20%.

Course Goals: Processes for separating mixtures are critically important in the chemical, pharmaceutical, and food industries, and in the environmental engineering field. The purpose of this course is to develop skills in qualitative reasoning and the conceptual design of separation processes as well as skills in the detailed quantitative design of separation equipment. An example of qualitative reasoning is the selection of what is likely the most efficient separation method based on an inspection of the physical properties of the components to be separated. An example of quantitative design is the determination of the optimal solvent to use, the optimal solvent flow rate, and the corresponding optimal number of equilibrium stages for a liquid extraction process which removes a pollutant from wastewater.

Course Outline:

Week	Reading	Topics
1	Chpt. 1	Organize course, general features of separation processes.
2, 3	Handouts	Basic elements of numerical methods.
	Chpt. 2	Numerical methods using Excel and Matlab, phase equilibrium.
4	Chpt. 2	Binary and multicomponent single-stage processes, lever rule, description rule, rate-governed processes.
5	Chpt. 3	Staging of separation processes. Introduction to ChemSep and Aspen
6, 7	Chpt. 4	Binary distillation, Midterm 1: October 7.
8	Chpt. 5	Multicomponent distillation
	Handout	
9	Chpts. 12,13	Absorption, stripping, extraction.
10		Kremsers-Sauders-Brown equation
11	Chpt. 10,14	Curved operating lines, equipment capacity.
12	Chpt. 10,15	Stage efficiency, continuous contactors. Midterm 2: Nov. 18.
13	Handout	Adsorption, ion exchange, chromatography.
14	Handout	Membrane processes.
15	Chpt. 14	Energy considerations, selection and synthesis of separation processes, bioseparations.
	Handout	

Statement on Academic Conduct

By enrolling in this course, each student assumes the responsibility of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the UMBC Faculty Handbook, the UMBC Policies Section of the UMBC Directory, or the UMBC website.

In order for the grading in this course to be as fair as possible, you are expressly prohibited from accessing homework and examinations given in any of the previous years that this course has been taught. Adequate samples of previous work will be provided to you as needed. Anyone who does not abide by this prohibition will be in violation of the Academic Conduct Policy for this course.