

Course Objectives and Topics

Upon completion of this class, the student will: 1) have the ability to identify, formulate, and solve engineering problems applied to separations; 2) apply equilibrium relationships, mass and energy balances and stoichiometric relationships to a staged approach to separations processes; 3) have proficiency in the use of computers and software applied to the design of separations processes.

Specific topics for this class include:

- Introduction to Separations Methods
- Phase Equilibrium
- Flash Distillation
- Binary Distillation
- Multi-component Distillation
- Absorption & Stripping
- Liquid-Liquid Extraction
- Batch Distillation
- Intro to Membrane Separations (time permitting)

Textbook

Primary text: Philip C. Wankat, "Separation Process Engineering", 3rd edition, (2011) Prentice Hall.

Reference Text: J.D. Seader and E. Henley, "Separation Process Principles", John Wiley & Sons

Instructor

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Teaching Assistant

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Office hours: Wednesday (starting January 20), 4:30 PM to 5:30 PM; Thursday, 3 to 4 – Third floor of Nitschke Hall

Instructor Office Hours

You are welcome to stop by my office at any time and if I can't see you at that moment we will make an appointment. Making an appointment by e-mail is the best way to set up a mutually convenient time.

Grading

Letter grades will be assigned based on the percentage of points accumulated using the scale: A, 100-90; B, 89-81; C, 80-71; D, 70-65; F, below 65.

Exams: All cell phones must be out of sight during an exam. Three exams will be given during the semester. If you miss an exam for any reason, that exam will be assigned a score of zero. The final exam will consist of three parts with coverage similar to the semester exams (Exam I, Exam II and Exam III). You may take any, all or no parts of the final exam. The final exam section grade will substitute for the semester exam grade if higher. Exam dates are **Feb 12, March 23 and April 25.**

Homework: You may work in groups of two for homework assignments unless the assignment is designated an individual assignment. Homework is due at the start of class on the due date. Late homeworks will not be accepted and will be assigned a grade of zero. Most homeworks will be assigned one of three grades; $\sqrt{+}$ (95%), $\sqrt{}$ (82%); or $\sqrt{-}$ (70%). These homeworks will not be graded in detail. Solutions will be posted on the course website. Some homeworks will be graded on a scale of 1 to 100% (indicated on assignment).

Projects: One or more projects will be assigned during the semester. Projects are aimed to be open-ended design problems.

The point total will consist of a sum of the following items.

Exams (three) 28% each	84%
Homework	6%
Projects	10%

Tentative Schedule

Week	Topics	Chapter
Jan 11	Introduction and VLE	1
Jan 18	MKL Day - Jan 18, no class! VLE & Intro to binary flash distillation	2
Jan 26	Flash Distillation	Jan 22 – ASPEN in NE1039 (VLE) 2
Feb 2	Multi-component Flash	Feb 5– ASPEN in NE1039 (Flash) 2
Feb 9	Intro to distillation	Feb 12 – Exam 1 3
Feb 16	Binary Distillation, Limiting operation conditions	4
Feb 23	Binary Distillation-multiple feeds, Open steam heating	4
Mar 2	Multi-component Distillation, Shortcut Methods	5
Mar 9	Spring Break- no class this week!	
Mar 16	Multi-component Distillation; Design Project , Distillation column design March 18, ASPEN in NE1039 (Shortcut & Rigorous column)	7, 10
Mar 23	Advanced distillation, Batch Distillation	Mar 23 – Exam 2 8, 9
Mar 30	Batch Distillation	9
Apr 6	Absorption & stripping	12
Apr 13	Liquid extraction	Design project due Fri, Apr 15 13
Apr 20	Liquid extraction	13
Apr 27	April 25 - Exam 3	Exam review (F)
May 4	Final Exam	Wed 10:15-12:15

Honors students

Honors students must provide step-by-step solutions to instructor selected homework problems in a Word document. Students may work in groups of two. Contact the instructor with a request for group by January 26th.

Academic Misconduct Policy

Consistent with the University of Toledo Academic Dishonesty Policy (3364-71-04), a grade of zero will be given for any assignment for giving or receiving substantive aid during the course of the assignment (copying) for the first instance. A failing grade for the course will be given for repeated offenses.

A grade of F for the course will be assigned for cheating on any exam. This includes: communicating during an examination in any manner with any unauthorized person concerning the examination or any part of it; and giving or receiving substantive aid during the course of an examination.

If you have any questions regarding this policy, please contact the instructor.