



## ChE 463: Separation Processes

3 credit hour, 3 contact hour lecture, 3 credit hour Eng.

### Instructor

Instructor: Dr. Mohammed Al-Saleh

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### Textbooks & References

#### A. Textbook

	<b>Textbook 1</b>
<b>Title</b>	Transport Processes and Separation Process Principles
<b>Author(s)</b>	Christie Geankoplis
<b>Publisher</b>	Prentice Hall
<b>Year</b>	2003
<b>Edition</b>	4 <sup>th</sup> Edition

#### B. References

1. Henley, E.J., J.D. Seader, and D.K. Roper, Separation Process Principles 3rd ed. 2011: Wiley.
2. Wankat, P.C., Separation Process Engineering: Includes Mass Transfer Analysis, 3rd Ed. 2011: Prentice Hall PTR.
3. Harker, J.H., J.F. Richardson, and J.R. Backhurst, Coulson & Richardson's chemical engineering. 3rd ed. Vol. 2.
4. McCabe, W.L., J. Smith, and P. Harriott, Unit Operations of Chemical Engineering. 7th ed. 2005: McGraw-Hill Education.

### Specific Course Information

#### A. Course Catalog:

Applying mass transfer principles, chemical engineering thermodynamics basics and mass and energy balances to design binary and multi-component, single-stage and multi-stage, batch and continuous, physical separation processes. The covered separation processes are distillation, extraction, leaching and drying.

#### B. Prerequisites or co-requisites

Prerequisite: ChE 364

#### C. Required, Elective or Selected Elective

Required

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## Objectives and Outcomes\*

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1. Apply fundamental knowledge to derive VLE equilibrium data [1, 2]
2. Ability to choose a suitable separation method [1, 2]
3. Ability to use McCabe-Thiele method to calculate number of stages in distillation [1, 2]
4. Ability to design packed distillation columns [1, 2]
5. Ability to use shortcut methods to calculate the number of stages in multicomponent distillation [1, 2]
6. Ability to calculate the number of stages in cross-current and counter-current extraction [1, 2]
7. Ability to design packed bed extraction column [1, 2]
8. Ability to find number of contact stages in leaching [1, 2]
9. Ability to create drying curves and estimate the time required for drying [1, 2]
10. Ability to determine the effect of the various operating conditions on the separation efficiency [1,2,6]

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## Contribution of Course to Meeting the Professional Component

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### Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
50	45				5	

### Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
Y	Y	-	-	-	-

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## Topics Covered

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1. Binary Distillation
2. Multicomponent Distillation
3. Extraction
4. Leaching
5. Drying

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## Evaluation

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Assessment Tool	Expected Due Date	Weight
Homework & Quizzes	One week after homework problems are assigned	10%
First Exam	According to the department schedule	25 %
Second Exam	According to the department schedule	25 %
Final Exam	According to the university schedule	40 %

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\* Number in brackets refer to the Program outcomes