هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Separation Process**
Course Code:	**231 CHET**
Program:	**Chemical Engineering Technology**
Department:	**Chemical Engineering Technology**
College:	**College of Applied Industrial Technology**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours: 3hr
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☒
3. Level/year at which this course is offered: Fifth level/3rd year
4. Pre-requisites for this course (if any)**:** 121 CHET
5. Co-requisites for this course (if any)**: No**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom/Blackboard**	5h/week	100
2	**Blended**	--	--
3	**E-learning**	--	--
4	**Distance learning**	--	--
5	**Other**	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	45
3	**Tutorial**	--
4	**Others** (specify)	--
	Total	**75**

B. Course Objectives and Learning Outcomes

1. Course Description

This course deals with the application of the science and engineering science that you have learned to the separation of chemical and biological mixtures. Specific processes considered will include distillation, gas absorption, extraction, adsorption, and membrane-based processes. The object of the subject is to understand how separation work, and to further develop your ability to apply basic principles to the solution of specific problems. Laboratory experiments and/or exercise problems support the theoretical classes

- This course introduces fundamentals of equilibrium-based unit operations frequently encountered in industry which include distillation, absorption and membrane etc.
- This course covers the fundamental concepts of equilibrium-based analysis of separation processes and gives examples of relevant separation processes. It introduces the concept and analysis of a unit operation as applied to separation processes and demonstrates the analysis of relevant separation processes by applying mass and energy balance methods.
- Distillation covers fractional, vacuum, steam, extractive, and azeotropic operations. The course also covers mixing processes and dimensionless numbers utilized for mass transfer calculation.

2. Course MainObjective

This course is designed for the 5th level students in chemical engineering. Separation processes constitute important unit operations in chemical process industries. Distillation is the most widely used industrial separation process. Good contact between two fluid phases is vital for effective separation in all processes that work by direct contact. Area of contact available per unit volume is an area of on-going development.

The overall objective of this section is to give the students visual illustration on the internals of gas/vapour-liquid contacting devices used to improve separation performances. At this point the course would be able to satisfy the following objectives:

- Explain how separations are used in a typical chemical plant
- Define the concepts of equilibrium stages and unit operations
- Explain what is meant by phase equilibrium
- Explain the basic concepts of mass transfer
- List the steps in the structured problem-solving approach and start to use this approach
- Have some familiarity with the prerequisites

The object of the subject is twofold: to understand how separation work, and to further develop your ability to apply basic principles to the solution of specific problems.

3. Course Learning Outcomes

	CLOs	AlignedPLOs
1	**Knowledge and understanding**	
1.1	Explain the fundamental and principles of separation processes	K1.2
2	Skills:	
2.1	Formulate and analyze the steps involved in distillation process	S1.1
2.2	Evaluate the energy involved with the type of separation processes	S2.1
2.3	Compute other processes based on the energy requirements for the processes	S4.2
3	**Values:**	
3.1	Manage deadlines for the given task (assignments) by utilizing the information from several sources of information.	V1.1
3.2	Identify the interpersonal skills and managed team work.	V2.2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Separations	3
2	Flash Distillation	2
3	Column Distillation	2
4	Internal Balances	2
5	Multi-component Distillation	3
6	Calculation Procedures	2

7	Shortcut Methods	2
8	Complex Distillation: Batch Distillation; Packed Column Design; Absorption and Stripping; Liquid-liquid Extraction	8
9	Mass Transfer Analysis and Membrane Separations	2
10	Review of course	2
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
1.0	**Knowledge and Understanding**		
1.1	Explain the fundamental and principles of separation processes	Lecture, tutorial, active learning	Quizzes, class activities, exams
2.0	**Skills**		
2.1	Formulate and analyze the steps involved in distillation process	Lecture, tutorial, active learning	Quizzes, class activities, exams
2.2	Evaluate the energy involved with the type of separation processes		
2.3	Compute other processes based on the energy requirements for the processes		
3.0	**Values**		
3.1	Manage deadlines for the given task (assignments) by utilizing the information from several sources of information.	Lab/Active learning	Lab exam Participation in classroom
3.2	Identify the interpersonal skills and managed team work.	Lab/group discussion	Active participation in lab work activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class activities (Quizzes, Assignments, Labs) every week from week 4 to week 13	Week 4 till Week 13	20%
2	Oral discussion and participation in classroom	All weeks	10%
3	Midterm	Week 6	25%
4	Final Term Exam	As scheduled	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Office hours are specified, and instructors can be reached through emails/message groups/WhatsApp/Phone calls.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Phillip C Wankat - Separation process engineering _ includes mass transfer analysis-Prentice Hall.
Essential References Materials	• Transport processes and Unit Operations, second edition, Prentice hall international 1993, inc., by Christil J Geankolpis.
Electronic Materials	• Lecture slides (other reading materials)
Other Learning Materials	• Yes • Internet source, lecture notes etc.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms should be furnished for 25 students with • White board • Appropriate Chairs • BB (if it is an online teaching)
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computer with data show.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Not utilized

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Confidential student Course Evaluation Survey	Institution	Online/Direct Survey
End of semester CLO	Course Coordinator	Direct Survey

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes,Quality oflearning resources, etc.)
Evaluators (Students,Faculty, Program Leaders,Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

H. Specification Approval Data

Council / Committee	Chemical Engineering Technology
Reference No.	CAITCHET211101
Date	01/02/2022