هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Mass Transfer Operations
Course Code:	224 CHET
Program:	Chemical Engineering Technology (CHET)
Department:	Chemical Engineering Technology (CET)
College:	College of Applied Industrial Technology (CAIT)
Institution:	Jazan University
Version:	T-104 - 2022
Last Revision Date:	2023

Table of Contents:

A. General Information about the Course

Course Identification

1. Credit Hours: 3
2. Course Type:
   a. University ☐ College ☐ Department ☑ Track ☐ Others ☐
   b. Required ☑ Elective ☐
3. Level/year at which this course is offered: 5th Level 2nd Year
4. Course General Description

   This course presents the principles of mass transfer and their application to separation and purification processes. The course integrates Momentum transfer (CHET 121) and heat transfer (CHET 241) in developing rate expressions for mass transfer in multiphase, multi-component systems. Empirical correlations for mass coefficients in various situations; Dimensionless numbers and their significance. The course is introduced through two classes weekly. They are 2 classes (1 hour each) for theoretical part and 2 hours class for laboratory for which students apply and implement the concepts of the lectures.

5. Pre-requirements for this course (if any): 114 CHET
6. Co- requirements for this course (if any): -------
7. Course Main Objective(s):

   This course is designed to give 6th level students in chemical engineering the basics of mass transfer process. Basic law (Fick's law) of diffusion and mechanisms of steady state mass transfer are introduced along with their applications to different geometry. This course is supported by laboratory experiments on diffusion and adsorption process.

1. **Teaching Mode: (Mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentages
1	Traditional classrooms	48	100.0%
2	E-learning	0	0.0%
3	Hybride * Traditional classrooms * E-learning	0	0.0%
4	Distance learning	0	0.0%

2. **Contact Hours (based on the academic semester)**

No	Activity	Contact Hours
1	Lectures	24
2	Laboratory/Studio	24
3	Field	0
4	Tutorial	0
5	Others (specify)	0
	Total	**48**

Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes (CLOs)	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain about basic theory and laws of mass transfer unit operations (Distillation, Absorption and Leaching etc).	K1.2	Structured Lectures Worked Examples	Exams Exams
2.0	**Skills**			
2.1	Analyzing correlations for evaluations of mass transfer coefficient with applying the knowledge, techniques: skills, mathematics, science, and technology.	S1.1	Structured Lectures Worked Examples	Exams Exams
2.2	Evaluate the composition of the binary and multi-component system using VLE (T-xy, P-xy, X-Y); concept of volatility in distillation, absorption and extraction processes etc.	S2.2	Structured Lectures Worked Examples	Exams Exams
2.3	Solve mass transfer related problems for example using McCabe Thile method for trays calculations.	S4.3	Structured Lectures Worked Examples	Exams Exams
3.0	**Values, autonomy, and responsibility**			
3.1	Managing deadlines for the given task (assignments) by utilizing the information from several sources of information.	V1.3	Collaborative Learning Collaborative Learning	Presentation Oral
3.2	Show independent timeliness work in classroom with effective contribution with classmates.	V2.3	Worked Examples Collaborative Learning	Presentation Oral

C. Course Content

No	List of Topics	Contact Hours
1	Introduction •Mass Transfer? •Units and Basic Calculation	2
2	Rate Principles •Fick's law, Diffusion in Gases and Liquids Mass Transfer Coefficients	2
3	Overall Mass Transfer Coefficients •Equimolar Counter diffusion and/or Diffusion in Dilute Solutions Mass Transfer Equipment	4
4	MID-EXAM	2
5	Distillation Operation •Flash Distillation •Batch Distillation	4
6	McCabe–Thiele Graphical Method •Plate calculation for the continuous distillation •Applying to the binary mixture	2
7	Humidification and Drying Introduction and industrial applications Crystallization	2
8	Raoult's Law Clapeyron Equation Antoine Equation	4
9	Course review for the final exam (Self Study)	2
10	Lab and Lab Reports	24
	Total	**48**

D. Students Assessment Activities

No	Assessment Activities	Assessment Timing (In Week No)	Percentage of Total Assessment Score
1	QUIZ	Week 3	10%
2	MIDEXAM	Week 7	20%
3	ACTIVITY_During whole Semeste	Week 10	5%
4	HOMEWORK	Week 10	10%
5	LAB	Week 10	15%
6	Final Exam	As Scheduled	40%

* Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1 References and Learning Resources

Essential References	1	•Transport processes and Unit Operations, second edition, Prentice hall international 1993, inc., by Christil J Geankolpis.
	2	Lecture slides (other reading materials)
Supportive References	1	•Robert E.Treybal, Mass Transfer Operations, 3rd Ed.
Electronic Materials	1	Internet source, lecture notes etc.
Other Learning Materials	1	•Yes Internet source, lecture notes etc

2 Required Facilities and Equipment

Items	Resources
Facilities (Classrooms, Laboratories, Exhibition rooms, Simulation Room, etc.)	
Technology Equipment (Projector, Smart Board, Software)	Suitable Software
Other Equipment (Depending on the nature of the specialty)	Simulation Software Simulation Lab Tables and Stools

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Method
Effectiveness of Teaching	Student	Indirect
	Course Instructor (Faculty)	Direct
Quality of Learning Resources	Program Coordinator	Indirect
	Head of Department	Direct
	Quality Auditor	Indirect
The extent to which CLOs have been achieved	Course Instructor (Faculty)	Direct
	Quality Auditor	Direct
Other	Course Coordinator	Indirect
	Quality Auditor	Indirect

G. Specification Approval Data

Council/Committee	Chemical Engineering Technology (CET)
Reference Number	CAITCET24012
Date	17-04-2024