هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	Mass Transfer Operations
Course Code:	251 CHET
Program:	Chemical Engineering Technology
Department:	Chemical Engineering Technology
College:	College of Applied Industrial Technology
Institution:	Jazan University

Table of Contents

A. Course Identification **3**

6. Mode of Instruction (mark all that apply) 3

B. Course Objectives and Learning Outcomes **3**

1. Course Description 3

2. Course Main Objective 3

3. Course Learning Outcomes 4

C. Course Content **4**

D. Teaching and Assessment **5**

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods 5

2. Assessment Tasks for Students 6

E. Student Academic Counseling and Support **6**

F. Learning Resources and Facilities **6**

1.Learning Resources 6

2. Facilities Required 7

G. Course Quality Evaluation **7**

H. Specification Approval Data **7**

A. Course Identification

1. Credit hours: (2lec+2lab)h/week = 4 hr/week
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ☐ Elective ■
3. Level/year at which this course is offered:
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**	60	%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**	30
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**60**

B. Course Objectives and Learning Outcomes

1. Course 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.

2. Course MainObjective

This course is designed to give 6thlevel 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.

3. Course Learning Outcomes

CLOs		AlignedPLOs
1	**Knowledge and Understanding**	
1.1	***Explain*** about basic theory and laws of mass transfer unit operations (Distillation, Absorption and Leaching etc).	K1.2
...		
2	**Skills:**	
2.1	***Analyzing*** correlations for evaluations of mass transfer coefficient with applying the knowledge, techniques: skills, mathematics, science, and technology.	S1.1
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
2.3	***Solve*** mass transfer related problems for example using McCabe Thile method for trays calculations.	S4.2
...		
3	**Values:**	
3.1	***Managing*** deadlines for the given task (assignments) by utilizing the information from several sources of information.	V1.3
3.2	***Show*** independent timeliness work in classroom with effective contribution with classmates.	V2.2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction • Mass Transfer? • Units and Basic Calculation • Fundamental Concepts (Temp, Press, Mass, Moles etc) Phase Equilibrium • Gibbs Phase rule, Raoult's Law, Henry' Law	4
2	Rate Principles • Fick's law, Diffusion in Gases and Liquids Mass Transfer Coefficients • Individual Mass Transfer Coefficients • Equimolar Counterdiffusion • Diffusion of Component A Through Non-Diffusing Component B	4
3	Overall Mass Transfer Coefficients • Equimolar Counterdiffusion and/or Diffusion in Dilute Solutions Mass Transfer Equipment • Distillation • Absorption	4

	• Adsorption etc	
3		
	MID EXAM	2
4	**Distillation Operation** • Flash Distillation • Batch Distillation **Distillation Operation** • Continuous Distillation with Reflux • Working load • Work and Power	6
5	**McCabe–Thiele Graphical Method** • Plate calculation for the continuous distillation • Applying to the binary mixture **Absorption** • Introduction and Column types	4
6	**Humidification and Drying** Introduction and industrial applications **Crystallization** Process Introduction and basics **Membrane Separation Processes** Basics principles and types of separations	6
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*** about basic theory and laws of mass transfer unit operations (Distillation, Absorption and Leaching etc).	Lecture, tutorial, active learning	Quizzes, class activities, exams
…			
2.0	**Skills**		
2.1	***Analyzing*** correlations for evaluations of mass transfer coefficient with applying the knowledge, techniques: skills, mathematics, science, and technology.	Lecture, tutorial, active learning	Quizzes, class activities, 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.	Lecture, tutorial, active learning	Quizzes, class activities, exams
2.3	***Solve*** mass transfer related problems	Lecture, tutorial, active	Quizzes, class

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
	for example using McCabe Thile method for trays calculations.	learning	activities, exams
…			
3.0	**Values**		
3.1	***Managing*** deadlines for the given task (assignments) by utilizing the information from several sources of information.	Lab/ Active learning	Lab exam, Participation in classroom oral discussion
3.2	***Show*** independent timeliness work in classroom with effective contribution with classmates.	Lab/ Group Discussion	Lab exam/ Participation in classroom oral discussion
…			

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 (average 3.5 marks each)	Week 4 till Week 13	30%
2	Oral discussion and participation in classroom	All weeks	5%
3	Midterm	Week 6	15%
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//WhatsApp/Phone calls.

F. Learning Resources and Facilities

1.Learning Resources

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

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