MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mass Transfer 1			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	UOMU0206053				
ECTS Credits	6				
SWL (hr/sem)	180				
Module Level		UGIII	**Semester of Delivery**		Five
Administering Department		**Fuel and Energy Techniques Engineering**	**College**	**Technical Engineering College**	
Module Leader	**Alaa Thari Jawad**		**e-mail**	alaa.thari.jawad@uomus.edu.iq	
Module Leader's Acad. Title		**Assistant Professor Dr.**	**Module Leader's Qualification**		**Ph.Dr. Chemical. Engineering - Chemical processes**
Module Tutor	**Msc. Zainab Hassan Ali**		**e-mail**	Zainab.Hassan.Ali@uomus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Fundamentals	**Semester**	L1-S2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	To introduce the basic principles of chemical engineering separation processes and mass transfer and then proceed to study the design and operation of separation processes units operation such as distillation, gas-liquid absorption and stripping, liquid-liquid extraction, adsorption and crystallization.
Module Learning Outcomes	At the end of the course, students are able to: 1. Solve simple problems involving diffusion. 2. Apply analogies to obtain transport coefficients. 3. Use stage equations to perform calculation in binary distillation and gas absorption designs. 4. Calculate number of stages in multi-components distillation column. 5. Choose suitable methods to calculate number of stages or height of distillation and gas absorption column. 6. Calculate number of stages in liquid extraction tower
Indicative Contents	Indicative content includes the following. Mass transfer: Integral and differential mass/mole balances.Fick's first and second laws for binary mass transfer. Mass transfer in turbulent flow. Film theory models. Molecular diffusion in gases, liquids and solids; diffusivity measurement and prediction; multi-component diffusion. Eddy diffusion, concept of mass transfer coefficients, theories of mass transfer, different transport analogies, application of correlations for mass transfer coefficients, inter phase mass transfer, relationship between individual and overall mass transfer coefficients. NTU and NTP concepts, Stage-wise and differential contractors. Binary Continuous Distillation: McCabe-Thiele method. Design considerations: feed stage location, minimum reflux/boilup ratio, minimum number of stages

	Absorption & Stripping: Minimum flow rate, Number of equilibrium stages. Stage efficiency, Packed columns. Humidification–Equilibrium, humidity chart, adiabatic and wet bulb temperatures; humidification operations; theory and design of cooling towers, dehumidifiers and humidifiers using enthalpy transfer unit concept.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	106	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	Introduction
Week 2	Diffusion: Mechanism and Theory
Week 3	Diffusion in a Stagnant Layer
Week 4	Equimolar and Unequimolar Counter Diffusion
Week 5	Diffusion Through Varying Area, Multi-component diffusion, prediction of diffusivity, Diffusion in gases and liquids.
Week 6	Distillation: Introduction of distillation
Week 7	Binary Flash Distillation,
Week 8	Fractionation Distillation
Week 9	Number of stages by McCabe-Thiele and Lewis-Sorel Methods,
Week 10	Number of stages at total reflux and Minimum Reflux Ratio, Distillation Efficiency
Week 11	Multi-component Distillation
Week 12	Exact Computation and Short Cut Method,
Week 13	bubble and dew point calculations.
Week 14	Design of distillation
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: determine the Liquid phase mass transfer mass transfer coefficient in a wetted wall column
Week 2	Lab 2: determine the diffusion coefficient of an organic vapour i.e. CCl4 in Air
Week 3	Lab 3: To study the effect of temperature on the diffusion co-efficien
Week 4	Lab 4: o determine the mass transfer coefficient in Humidification and Dehumidification

Week 5	Lab 5: determine the Vapour-Liquid Equilibrium (VLE) curve for theCCl4toluene mixture(Computerized)
Week 6	Lab 6: determine the Vapour-Liquid Equilibrium (VLE) curve for the CCl4 toluene mixture
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	➢ T.K.Sherwood, R.L.Pigford and C.R.Wilke, Mass Transfer, McGrawHill, ➢ Coulson & Richardson's ,"Chemical Engineering" volume 2 , (2003) ➢ Binay K. Dutta "Principle of Mass Transfer and Separation Processes" ➢ Treybal, R.E., 'Mass Transfer Operations", 3rd edition, 1980, McGraw Hill.	No

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.