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					
ECTS Credits	**6**				
SWL (hr/sem)	**180**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Fuel and Energy Technologies Engineering		**College**	Shatt Al-Arab University College	
Module Leader	Maha munadhil salman		**e-mail**	**maha.munadhil.ali@sa-uc.edu.iq**	
Module Leader's Acad. Title	Assitance Lectrur		**Module Leader's Qualification**	M.Sc Chemistry	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mass transfer 1	**Semester**	five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	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 مخرجات التعلم للمادة الدراسية	Gas absorption including application, different types of equipment in industry, process design of a column to find the height and diameter of the column, required solvent flow rate. The concepts and procedure for their calculation of the number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are immiscible, including application, different types of equipment in industry, solvent selection, process design of a column to find the height and the diameter of the column and the required solvent flow rate. The concepts and procedure for their calculation of number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are miscible, including application, different types of equipment in industry, solvent selection, process design of counter-current and cross flow stage wise operations to find the number of stages to meet operation constraints.
Indicative Contents المحتويات الإرشادية	1- Explain the physical phenomena, theoretical concepts and design aspects of mass transfer in separation processes, including distillation, gas-liquid absorption, gas-solid adsorption, liquid-liquid extraction and Drying. 2- Analyze the important separation processes of distillation, gas absorption, adsorption, liquid-liquid extraction and drying and carry out design calculations appropriately of the above processes. Apply simplifying assumptions to complex problems in order to gain useful design information individually and in a team.

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

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,6,9,12	
	Assignments	2	10% (10)	7,13	
	Seminar	1	10% (10)	Continuous	
	Report/ Lab.	1	10% (10)	2,3,4,5,6,7	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Absorption of Gases: Introduction Two Film Theory
Week 2	Determination of transfer coefficients , number of stages in absorption column
Week 3	Design of Absorption Column using Height of Transfer Unit, Minimum Liquid Flow Rate
Week 4	Packed towers for gas absorption, plate towers for gas absorption
Week 5	Stripping: introduction
Week 6	Stripping Column, Height of Packed-bed and Number of Stages in Stripping Column
Week 7	Liquid-liquid Extraction, Ternary system of extraction,
Week 8	Extraction calculations of partial solubility and non-soluble liquids
Week 9	Design of co-current and counter-current extraction for miscible and immiscible liquids
Week 10	Drying. General principles
Week 11	Rate of drying, the mechanism of moisture movement during drying.
Week 12	Drying equipment specialised drying methods the drying of gases
Week 13	**Leaching** introduction mass transfer in leaching operations
Week 14	Countercurrent washing of solids, calculation of the number of stages
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	

Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ T.K.Sherwood, R.L.Pigford and C.R.Wilke, Mass Transfer, McGrawHill, ➢ Coulson & Richardson's ,"Chemical Engineering" volume 2 , (2003)	yes
Recommended Texts	➢ Binay K. Dutta "Principle of Mass Transfer and Separation Processes" Treybal, R.E., 'Mass Transfer Operations", 3rd edition, 1980, McGraw Hill	no
Websites	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Organic_Chemistry_Nomenclature_Workbook_(O'Donnell)	

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