MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Separation methods**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Che-24119**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Chem		**College**	CoS	
Module Leader	Marwah Hashim Abdulateef		**e-mail**	marwahhashim@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Learning students analytical chemistry fundamentals in specific knowledge of gravimetric analysis chemistry, classification of gravimetric analysis, precipitation analysis, types of precipitating reagents, inorganic precipitants and organic precipitants, properties of precipitant used for gravimetric analysis, calculation of gravimetric analysis, gravimetric factor, solubility of precipitates and Solubility product (Ksp), calculation the solubility from Ksp, solubility problems, The affected factors on the solubility of the precipitates, Contamination of the precipitates and its types , avoiding impurities, digestion of precipitates, washing solutions, drying and ignition of the precipitates, Statistic in analytical chemistry with examples. - Learning students, the fundamentals of analytical separation methods: classification of separation methods, masking agents, liquid-liquid extraction, solvent extraction fundamentals, separation and classification of chromatography, separation by ion exchanges. - Teaching and learning students all the subjects, that related to the analytical chemistry course, which allow them to be qualified working in different aspects of analytical chemistry
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Enable students to gain knowledge and understanding of the intellectual framework of analytical chemistry. Enable students to acquire knowledge and understanding of international chemical standards. Enable students to acquire knowledge and understanding of the laws of chemistry. Enable students to acquire knowledge and understanding of chemical analysis standards in gravimetric chemistry and separation methods.- Enabling students to obtain knowledge and understanding of the law of the wrong use of chemicals.
Indicative Contents المحتويات الإرشادية	analytical chemistry fundamentals, gravimetric analysis chemistry, precipitation analysis, precipitating reagents, inorganic precipitants , organic precipitants, properties of precipitant, calculation of gravimetric analysis, gravimetric factor, solubility of precipitates ,Solubility product (Ksp), solubility problems, affected factors on the solubility of the precipitates, Contamination of the precipitates,

	impurities, digestion of precipitates, washing solutions, , Statistic in analytical chemistry.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Method of lectures (clarification and explanation of the study materials) through the blackboard, smart board, and computer. -Providing students with the basics and additional topics related to previous education outcomes for skills to solve scientific problems. -Providing students with knowledge through homework and assignments for analytical chemistry. -Asking students to visit the library to obtain additional knowledge of the study materials. -Improving students' skills by visiting websites to obtain additional knowledge of the study subjects. -Asking students during the lecture to solve some practical problems..

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Washing of precipitates, washing solutions, drying and ignition of the precipitates
Week 2	Statistic in analytical chemistry with examples
Week 3	Introduction and fundamentals of separation methods, and their types
Week 4	Classification of separation methods, their advantages with examples,
Week 5	Separation by chemical precipitation and their applications with examples, masking agents
Week 6	separation by distillation fundamentals, their types and applications, affected factor on distillation separation
Week 7	separation, solvent extraction fundamentals, extraction methods, liquid-liquid extraction, solid-liquid extraction, extraction efficiency, examples
Week 8	**Midterm Exam**
Week 9	The affected factor on the extraction separation, the effect of of pH, the effect of complexes formation, extraction techniques
Week 10	Introduction of Chromatographic separation, chromatographic separation fundamentals,

	chromatographic methods classification, mobile phase, and stationary phase
Week 11	Thin layer chromatography, paper chromatography و column chromatography with adsorption, gas chromatography, applications with examples
Week 12	Chromatographic separation techniques, separation by HPLC technique, ion exchange
Week 13	Chromatographic analysis fundamentals, Van-Deemter equation, retention time, rate separation and resolution, resolution with retention time, rate and plate theories, examples with problems
Week 14	Separation by ion exchanges fundamentals, anion exchange, cation exchange, ion exchanges classification, capacity of ion exchange, equilibrium of ion exchange with examples and applications
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Experiment for determination of chloride in the form of silver chloride
Week 2	Experiment for determination of chloride in the form of silver chloride
Week 3	Experiment of determination of sulfate in the form of barium sulfate
Week 4	Experiment of determination of sulfate in the form of barium sulfate
Week 5	Experimental determination of lead in the form of lead chromate
Week 6	Experimental determination of lead in the form of lead chromate
Week 7	Experiment with the determination of aluminum in the form of aluminum oxaniate
Week 8	Experiment with the determination of aluminum in the form of aluminum oxaniate
Week 9	Experiment with determination of magnesium in the form of magnesium pyrophosphate
Week 10	Experiment with determination of magnesium in the form of magnesium pyrophosphate
Week 11	Laboratory analysis of a cement sample
Week 12	Laboratory analysis of a cement sample
Week 13	Define the student By direct and indirect methods of separation

Week 14	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M. West. Eight Edition	Yes
Recommended Texts	1: Analytical Chemistry, Gary, Christian Sixth Edition 2: Chemical Analysis, Modern Instrumentation Methods and Techniques, Francis Rouessac and Annick Rouessac Second Edition	No
Websites	www.chemicalprocessing.com www.bytoco.com	

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.