	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Medical Physics	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Analytical chemistry			**Module Delivery**	
Module Type	CORE			☒**Theory** ☒**Lecture** ☒**Lab** ☒**Tutorial** ☒**Practical** ☒**Seminar**	
Module Code	CREQ1105				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department	MPHY		**College**	College of Science	
Module Leader	Talib Hamid Mawat		**e-mail**	Dr.talib_h@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Shams aws ismael		**e-mail**	Shams.aws@nahraininiv.edu.iq	
Module Reviewer	Dena ahmed hashem			Dina.ahmed@nahrainuniv.edu.iq	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**		

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 Aims أهداف المادة الدراسية	1. Introduction to Analytical Chemistry, focusing on why analytical chemistry is important and outlining the fundamental steps a professional chemist follows when solving analytical problems. 2. Comprehensive introduction to mass and volume concepts in chemistry, leading to a clear and practical understanding of the mole concept. 3. Development of core knowledge of concentration units used in analytical chemistry, including the relationships between these units and the ability to convert accurately from one to another. 4. Study of stoichiometry with direct emphasis on its connection to the mole concept and chemical calculations. 5. Foundational understanding of gravimetric analysis and solubility principles as applied in analytical chemistry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn proper approaches for understanding and analyzing analytical problems. 2. Introduce the fundamental definitions and concepts of volumetric and gravimetric analysis. 3. Develop a solid understanding of the mole concept and its application in stoichiometry. 4. Understand the principal units used in analytical chemistry and their significance. 5. Provide a general introduction to solubility and the common-ion effect. 6. Enhance students' ability to convert between units and handle numerical calculations accurately. 7. Build the ability to select an appropriate analytical method for a given analytical problem. 8. Develop skills in balancing chemical equations and performing stoichiometric calculations. 9. Establish basic laboratory skills for handling chemicals and applying simple methods for elemental detectio
Indicative Contents المحتويات الإرشادية	1. Areas of Chemical Analysis 2. The Modern Role of the Analytical Chemist 3. Main Branches of Analytical Chemistry 4. Classification of Quantitative Analytical Methods 5. Analytical Methodology and Problem-Solving Strategy 6. The Concept of the Mole (mol) 7. Molar Mass (Molecular Weight) 8. Mole-Based Calculations 9. Concentration Units in Analytical Chemistry: a. Molarity and Normality b. Molality

	c. Dilution Principles d. Volume per Volume (% v/v) e. Weight per Weight (% w/w) f. Weight per Volume (% w/v) g. Parts per Million (ppm) and Parts per Billion (ppb) Interconversion of Concentration Units Stoichiometry in Chemical Analysis Limiting and Excess Reagents Solubility and the Solubility Product (Ksp) The Common-Ion Effect
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Interactive classroom lectures supported by educational videos to enhance understanding and engagement. • Practical laboratory sessions focused on applying theoretical concepts and developing hands-on analytical skills. • Student-centered interactive teaching, where questions are raised during lectures and students work individually or in groups to explore and discuss relevant answers. • Weekly tutorials (2 hours) dedicated mainly to practicing and expanding problem-solving skills, with emphasis on numerical and calculation-based questions.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**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**	1	10% (10)	Continuous	All
	Online Assignments	1	5% (5)	Continuous	All
	Lab	1	15% (15)	Continuous	All
	Seminar	1	10% (10)	Continuous	All
Summative	**Midterm Exam**	2 hr	10% (10)	14	LO # 1-13

assessment	**Final Exam**	4hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1-2	**Learning basics of analytical chemistry and scientific steps of analysis.**
Week 3-5	**Solution preparation and concentration (molecular mass, Moles, Molarity, Molality, Normality, and other concentration units)**
Week 6-8	**units interchange (mol, ppm, ppb, w/w, w/v, v/v)**
Week 9-12	**Stoichiometric Relationships (balancing chemical equation and stoichiometry)**
Week 13	**Gravimetric methods of analysis (solubility and common ion effects)**
Week 14	**Mid Exam**
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Lab introduction and basic glassware.
Week 2	Lab 2: Analysis and identification of Group I Cations (Ag+, Hg22+ and Pb2+ – insoluble chlorides.
Week 3	Lab 3: Analysis and identification of Group I Cations in an unknown sample.
Week 4	Lab 4: Analysis and identification of Group II Cations (Hg2+, Pb2+, Cu2+, Bi3+, Cd2+, As3+, Sb3+ and Sn4+ – insoluble sulphides in acidic.
Week 5	Lab 5: lab review
Week 6	Lab 6: Analysis and identification of Group II Cations in an unknown sample.
Week 7	Lab 7: Analysis and identification of Group III Cations (Al3+. Fe3+, Co2+, Ni2+, Cr3+, Zn2+ and Mn2+ – insoluble sulphides.
Week 8	Lab 8: lab review
Week 9	Lab 9: Analysis and identification of Group III Cations in an unknown sample.
Week 10	Lab 10: Analysis and identification group IV Cations (Ca2+, Sr2+ and Ba2+ – carbonate precipitates.

Week 11	Lab 11: Analysis and identification of group IV Cations in an unknown sample.
Week 12	Lab 12: lab review
Week 13	Lab 13: Analysis and identification of Group V Cations (Mg2+, Na+, K+ and NH4+)
Week 14	Mid Exam
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamental of analytical chemistry, D.A. Skoog, D. M.West, F. J. Holler and S. R. Crouch, 8th ed., 2004, Brooks/Cole.	YES
Recommended Texts	Analytical chemistry, "Theoretical and Metrological Fundamentals", K. Danzer, 1st ed., 2006, Springer.	NO
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي