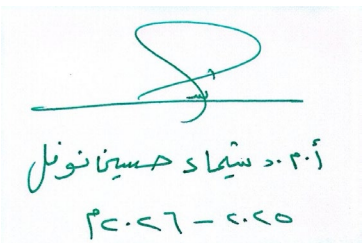
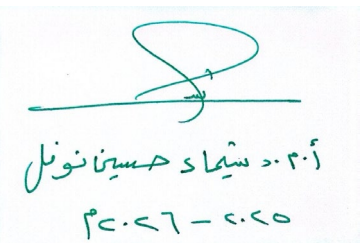
MODULE DESCRIPTION FORM

Module Information					
Module Title	**Analytical Chemistry**			**Module Delivery**	
Module Type	**Core**			**Theory √** **Lab √** **Tutorial √** **Seminar √**	
Module Code	**MPH102**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Medical Physics	**College**	College of Sciences	
Module Leader	Ashraf Hussain Saleh		**e-mail**	ashraf.h@uowa.edu.iq	
Module Leader's Acad. Title		Assist Lect	**Module Leader's Qualification**		Ms.c
Module Tutor	Ashraf Hussain Saleh		**e-mail**	ashraf.h@uowa.edu.iq	
Peer Reviewer Name		Dr. Ahmed Musa	**e-mail**	ahmed.mo@uowa.edu.iq	
Scientific Committee Approval Date		2025-12-20	**Version Number**	V 1.0	

Relation with other Modules			
Prerequisite module	No	**Semester**	/
Co-requisites module	No	**Semester**	/





Department Head Approval

Dean of the College Approval

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The student learns about: - The importance of analytical chemistry and its types. - The methods of finding concentrations of chemicals and the types of chemical titration. The basic principles of quantitative and qualitative analysis methods in analytical chemistry.
Module Learning Outcomes	The students will be able to: 1- Explain the fundamentals of analytical chemistry and the steps of a characteristic analysis, moreover, expresses the role of analytical chemistry in science. 2- Compare qualitative and quantitative analyses through, a- Expresses the quantitative analysis methods, b- Expresses the qualitative analysis methods, and c- evaluate the analytical data in terms of statistics. 3- Defines acids and base with their theories and explain their behaviours, though, study their properties such as ionic equilibrium and buffers solutions. 4- Explain the volumetric analysis of the solutions and express about the gravimetric calculations. 5- Express the titrimetric analysis methods, moreover, Expresses the terms such as standard solution, titration, back titration, equivalence point, end point, primary and secondary standard. Be prepared to write research through analysing the published research papers and writing a mini-research from them.
Indicative Contents	Indicative content includes the following: 1- **The scope of analytical chemistry**: Science seeks ever-improved means of measuring the chemical composition of natural and artificial materials by using techniques to identify the substances that may be present in a material and to determine the exact amounts of the identified substance. 2- **Quantitative analysis:** this topic includes explaining the technique that uses mathematical and statistical modelling, measurement, and research to understand behavior, and how it will be useful to the student in their life. 3- **Review of elementary concept** important to analytical chemistry: Strong and weak electrolytes; important weight and concentration units, the evaluation of analytical data: Definition of terms. An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods; gravimetric factor. 4- **Acids and bases**: explain the meaning of their concept and the available theories that were obtained to describe their behavior. 5- **Chemical equilibrium:** refers to the state of a system in which the concentration of the reactant and the concentration of the products do not change with time, and the system does not display any further change in properties. 6- **Ionic equilibrium:** The equilibrium established between the unionized molecules and the ions in the solution of weak electrolytes is called ionic equilibrium. 7- **Buffer solution**: describe an acid or a base aqueous solution consisting of a mixture of a weak acid and its conjugate base, or vice versa. 8- **Volumetric analysis** is a quantitative analytical method which is used widely. As the name suggests, this method involves the measurement of the volume of a solution whose concentration is known and applied to determine the attention of the analyte.

Learning and Teaching Strategies	
Strategies	1- Lectures 2- Discussion 3- Brainstorming Problem solving 4- Practical presentations& Simulation Method 5- Lab works (Practical in computer Lab 6- Projects Self-learning 7- Cooperative Learning.

Student Workload (SWL)			
Structured SWL (h/sem)	87	**Structured SWL (h/w)**	5.8
Unstructured SWL (h/sem)	85	**Unstructured SWL (h/w)**	5.6
Total SWL (h/sem)	**173 + 3 final = 175**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	12% (3)	2,4,7,8	1,2,3,4
	Lab	6	6% (1)	5,6,9,10,14,15	2,3,4,5,6
	Online Assig.	3	9% (3)	3,5,10	3,4,5
	Reports	7	7% (1)	2,3,4,5	2,3,4,7,8,11,12,13
	Seminar	2	6% (3)	All	1,2,3,4,5,6
Summative assessment	**Midterm Exam**	1 hr.	20	2,4,6,9	1,3,4
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Lecture 1: The Scope of Analytical Chemistry.**
Week 2	**Lecture 2: Quantitative Analysis.**
Week 3	**Lecture 3: Qualitative Analysis.**
Week 4	**Lecture 4: Acids and Bases.**
Week 5	**Lecture 5: Theories of Acids and Bases.**
Week 6	**Lecture 6: Chemical Equilibrium.**
Week 7	**Lecture 6: Chemical Equilibrium.**
Week 8	**Lecture 7: Ionic Equilibrium.**
Week 9	**Midterm Exam**
Week 10	**Lecture 8: Buffer Solution.**
Week 11	**Lecture 9: An Introduction to Volumetric Methods of Analysis.**
Week 12	**Lecture 10: Volumetric Calculations.**
Week 13	**Lecture 11: Acid Base Titration.**
Week 14	**Lecture 12: Precipitation Titration.**
Week 15	**Lecture 13: Reduction Oxidation Titration.**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Laboratory Safety and Acquaintance with Glassware and Apparatus in the Analytical Chemistry Laboratory
Week 2	Exp1: Prepare 0.1 M of Hydrochloric Acid Solution
Week 3	Exp2: Prepare 0.1 M of Sodium Chloride Powder.
Week 4	Exp3: Prepare 0.1 N of Sodium Hydroxide Powder.
Week 5	Discussion for the Reports of Experiment 1, and 2
Week 6	Discussion for the Reports of Experiment 3
Week 7	Exp4: Precipitation of Cation Elements (Ag, Cu and Pb ions).
Week 8	Exp5: Precipitation of Anion Elements (Cl and Br)
Weel 9	Discussion for Experiment 4
Week 10	Discussion for Experiment 5
Week 11	Exp6: Titration of Strong Acid with Strong Base
Week 12	Exp7: Titration of Sodium Hydroxide with Hydrochloric Acid Titration of Strong Acid with Weak Base
Week 13	Exp7: Titration of Sodium Hydroxide with Hydrochloric Acid Titration of Strong Acid with Weak Base
Week 14	Discussion for the experiments 6
Week 15	Discussion for the experiments 7

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	7th Edition of Analytical Chemistry Fundamentals of Analytical Chemistry Principles and Practice of Analytical Chemistry	No
Recommended Texts	Modern Analytical Chemistry.	No
Websites	https://tech.chemistrydocs.com/Books/Analytical/Analytical-Chemistry-by-Gary-D-Christian.pdf	

Grading Scheme				
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	مت,سط	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.