

# 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	Asst. Prof. Dr. Ali Jassam	e-mail	alijassim33@yahoo.com
Module Leader's Acad. Title	Assist Prof. Dr.	Module Leader's Qualification	PHD
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	2024-04-19	Version Number	V 1.0

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

  
 أ.م. د. شياد صبيح نويل  
 ٢٠٢٤/٤/١٩

**Department Head**  
**Approval**



  
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**Dean of the College**  
**Approval**

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	<p>The student learns about:</p> <ul style="list-style-type: none"> <li>- The importance of analytical chemistry and its types.</li> <li>- The methods of finding concentrations of chemicals and the types of chemical titration.</li> </ul> <p>The basic principles of quantitative and qualitative analysis methods in analytical chemistry.</p>
Module Learning Outcomes	<p>The students will be able to:</p> <ol style="list-style-type: none"> <li>1- Explain the fundamentals of analytical chemistry and the steps of a characteristic analysis, moreover, expresses the role of analytical chemistry in science.</li> <li>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.</li> <li>3- Defines acids and base with their theories and explain their behaviours, though, study their properties such as ionic equilibrium and buffers solutions.</li> <li>4- Explain the volumetric analysis of the solutions and express about the gravimetric calculations.</li> <li>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.</li> </ol> <p>Be prepared to write research through analysing the published research papers and writing a mini-research from them.</p>
Indicative Contents	<p>Indicative content includes the following:</p> <ol style="list-style-type: none"> <li>1- <b>The scope of analytical chemistry:</b> 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.</li> <li>2- <b>Quantitative analysis:</b> 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.</li> <li>3- <b>Review of elementary concept</b> 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.</li> <li>4- <b>Acids and bases:</b> explain the meaning of their concept and the available theories that were obtained to describe their behavior.</li> <li>5- <b>Chemical equilibrium:</b> 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.</li> <li>6- <b>Ionic equilibrium:</b> The equilibrium established between the unionized molecules and the ions in the solution of weak electrolytes is called ionic equilibrium.</li> <li>7- <b>Buffer solution:</b> describe an acid or a base aqueous solution consisting of a mixture of a weak acid and its conjugate base, or vice versa.</li> <li>8- <b>Volumetric analysis</b> 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.</li> </ol>

### Learning and Teaching Strategies

<b>Strategies</b>	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.
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### Student Workload (SWL)

<b>Structured SWL (h/sem)</b>	87	<b>Structured SWL (h/w)</b>	5.8
<b>Unstructured SWL (h/sem)</b>	85	<b>Unstructured SWL (h/w)</b>	5.6
<b>Total SWL (h/sem)</b>	<b>173 + 3 final = 175</b>		

### Module Evaluation

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

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

### Learning and Teaching Resources

	Text	Available in the Library?
<b>Required Texts</b>	7th Edition of Analytical Chemistry <u>Fundamentals of Analytical Chemistry</u> Principles and Practice of Analytical Chemistry	No
<b>Recommended Texts</b>	<u>Modern Analytical Chemistry.</u>	No
<b>Websites</b>	<a href="https://tech.chemistrydocs.com/Books/Analytical/Analytical-Chemistry-by-Gary-D-Christian.pdf">https://tech.chemistrydocs.com/Books/Analytical/Analytical-Chemistry-by-Gary-D-Christian.pdf</a>	

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