



Paramedical Program

Specialization	Medical Laboratories
Course Number	020807281
Course Title	Analytical Chemistry
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)



**Brief Course Description:**

This course deals with the Principles of quantitative analytical chemistry including basic statistics, gravimetric and volumetric methods of analysis.

Course Objectives:

Upon the completion of the course, the student should be able to:

- 1-Learn chemical principles that are important to analytical chemistry
- 2-Apply statistical methods for analyzing experimental data and test the validity of results and make reasonable conclusions about these results.
- 3-Learn the basics and applications of classical methods for quantitative chemical analysis (gravimetric and titrimetric)
- 4-Master the calculations for methods in objective number 3 above

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Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction:	<ul style="list-style-type: none"> -Definition of Analytical chemistry. -Qualitative and quantitative Analysis. -Standard definition -Methods of expressing concentrations of solutions. -Quantitative process of Analysis. 	
2	Data Treatment.	<ul style="list-style-type: none"> -Significant figures and Addition, Subtraction, Multiplication, Division -Methods and approximation. -Calculation of Mean, Median, Mode, Range and Relative, Absolute Standard Deviation. -Study of Error, Random and systematic Absolute Error. -Precision and Accuracy. 	
3	Acid- Base Titration and Equilibrium.	<ul style="list-style-type: none"> -Calculation of Ionization constants for Acids (K_a) and for Bases (K_b) and Relation ship between them. -Poly functional Acids and Bases. -Types of solvent and their effects for solvent.. -Acid- Base Equilibrium. -Calculation of PH Scale. -Buffers solution. -Acid - Base titration and drawing titration curve. -Calculation of titration -Questions (Applications). 	
4	Complex metric Titration.	<ul style="list-style-type: none"> -Complex metric Equilibrium, calculation , Formation and Dissociation constants. -Types of Ligands, coordination Number and effect on Formation constant. -Effect of formation constant on Titration Curves. -Specifications of EDTA and Reaction 	



		<p>with a metal Ion.</p> <ul style="list-style-type: none"> -Indicators on Complexes reactions. -Effect of PH on complexes reactions. -Questions (Application). 	
5	Reduction-Oxidation Titration	<ul style="list-style-type: none"> -Definition of Oxidation Reaction, Reduction Reaction, Oxidizing agent and Reducing agent. -Electrode potential and standard of Electrode potential. -Nernst Equation. -Half cell Reactions. -Redox Titration curves. -Equivalence – Point. -Color Indicators for Redox Reactions and using in Analysis such as: Permanganates and Dichromate. -Questions (Application). 	
6	Gravimetric Analysis.	<ul style="list-style-type: none"> -Equilibrium and Equilibrium constant. -Equilibrium in precipitation Reactions. -Solubility product constant and common Ion effect. -Steps of Gravimetric Analysis. -Gravimetric factor. -Detection of the End Point in Precipitation. -Questions (Applications). 	
7	Standard Solution.	<ul style="list-style-type: none"> - Definition and classification. -Methods of preparation. -Methods of expressing concentrations of solution. 	



**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Homework	10%	--/--/----
	Final Exam	50%	--/--/----

Teaching Methodology:

- ❖ Lectures
- ❖ Slides and posters
- ❖ Practice inside labs

Text Books & References:**Reference**

- 1- Daniel C.Harris Quantitative Chemical Analysis W.H.Freeman/NewYork2009th Edition,2015.
- 2- Analytical Chemistry, Gary D. Christian,purnenduk(2014)11th ed., John Wiley and Sons, Inc .,N.Y.
- 3- Foundations of An .Ch . Valcarcel Cases, Miguel, Lopez lorente .2018.springer International Publishing AG .
- 4- An Chem.Bryan M . Ham , Aihui MAham . 1st ed 2016. Wiley .

