Course Syllabus of Analytical Chemistry

Faculty: Medicine and Health Sciences
Department: Health Sciences
Program: Bachelor in Medical Laboratory

I. General information about the course instructor:

Name	Mashhour Ahmed Abdullah	Office Hours(3 Hours Weekly)					
Location & phone number	4119	Sat	Sun	Mon	Tue	Wed	Thu
Email	Mash1yem@gmail.com	1	-	1	-	-	1

II. General information about the course:

1.	Course Title :	Analytical chemistry				
2.	Course Code and Number :	BML121				
3.	Credit Hours :	Credit Hours				Total
		Theoretical	Seminar/Tutorial	Practical	Training	
		2	-	1	-	3
4.	Study Level and Semester:	Year 1/Semester 2				
5.	Pre-requisites:	BHS110				
6.	Co-requisites:	None				
7.	Program in which the course is offered:	Bachelor in Medical Laboratory				
8.	Teaching Language:	English				
9.	Instruction location:	University of Science and Technology, Sana'a ,Yemen				

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عميد الكلية:
د. عبد الله المخلافي

رئيس القسم:
د. عبد الحبيب القباطي

المراجع :
د. سما الاغبري
د. حميد الحبابي

الموصف :
د. مشهور الحمادي

III. Course Description

This course provides a student with the basic tools of analytical chemistry, calibrations, standardizations, and blank corrections, errors in analytical chemistry, aqueous solution and chemical equilibrium, effect of electrolytes on chemical equilibrium. The students will complete practical course to acquire practical skills.

The teaching strategies will include lectures, practical sessions, Log books, discussions and problem solving. The students will be evaluated through written exam, practical exam and evaluation of log books and reports. General and organic chemistry is a prerequisite.

IV. Course Aims: This course is aimed to:

1. Provide the student with the special language of analytical chemistry.
2. Develop good experimental protocols to tackle analytical problems in the Medical Laboratory area.
3. Enable the student to Interpret and evaluate analytical results.
4. Learn the student how to comprehend the basic ideas of expressing analytical concentrations.
5. Provide the student with critical thinking, problem-solving, and decision making, when dealing with theoretical and practical chemical information in this course.
6. Learn the student to work effectively as part of a team to collect data and/or to produce reports and presentations.

V. Course Intended Learning Outcomes (CILOs):

By the end of this course, students should be able to:

1. Explain the various concepts and fundamental of analytical chemistry.
2. Classify the different methods in analytical chemistry.
3. Explore the different methods of Analysis, calibration, standardization and blank correction.
4. Apply and handle properly the chemical compounds in the laboratory and be aware of the rules of good laboratory and storage practice to minimize the errors of an applied analytical method.
5. Practice the proper chemical analytical procedures for operation of standard instrumentation. and Solve problems in various analytical areas including, solution concentration, buffer pH, etc.
6. Apply the information technology skills, such as word processing and internet communication and online searches.

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المراجع:
د. سما الأغبري
د. حمود الحبابي

الموصف:
د. مشهور الحمادي

VI. Course Contents

Theoretical Aspect:

No.	Course Units	Sub-topics	Week due	Contact Hours
1	The nature of analytical chemistry	-Importance of analytical chemistry analytical prospective -Role of analytical chemistry. -Quantitative analytical chemistry. -An integral role for analytical chemistry -Common analytical problems	1st, 2nd	4
2	Basic Tools of Analytical Chemistry	-Numbers in Analytical Chemistry -Fundamental Units of Measure -Significant Figures - Units for Expressing Concentration - Molarity and Formality - Normality - Molality -Weight, Volume, and Weight-to-Volume ratios -Converting between Concentration Units -Using Conservation Principles in Stoichiometry Problems	3rd ,4th	4
3	The Language of Analytical Chemistry	-Analysis, Determination, and Measurement -Techniques, Methods, Procedures, and Protocols -Classifying Analytical Techniques -Selecting an Analytical Method 1. Accuracy 2. Precision 3. Sensitivity 4. Selectivity 5. Robustness and Ruggedness 6. Scale of Operation 7. Equipment, Time, and Cost 8. Making the Final Choice -Developing the Procedure 5. Compensating for Interferences 6. Calibration and Standardization 7. Sampling 8. Validation	5th .6th	4
4	Midterm exam		7th	2
5	Calibrations, ،Standardizations and Blank Corrections	-Calibrating Signals -Standardizing Methods 1. Reagents Used as Standards 2. Single-Point versus Multiple-Point Standardizations 3. External Standards 4. Standard Additions 5. Internal Standards -Linear Regression and Calibration Curves 1. Linear Regression of Straight-Line Calibration Curves	8th ,9th	4
6	Errors in analytical chemistry	Systematic Errors, their sources unsystematic errors Effect of unsystematic errors on analytical data Q-test	10th	2
7	Aqueous solution and Chemical	- Classifying Solutions of Electrolytes - Acids and Bases - Amphiprotic Species	11th, 12th	4

المراجع:
د. الأخرس
د. حمود الحبابي

الموصف:
د. مشهور الحمادي

	Equilibrium	- Autoprotolysis - Strengths of Acids and Bases - Chemical equilibrium - Equilibrium-Constant Expressions - Types of equilibrium constants encountered in analytical chemistry - Applying the Ion-Product Constant for Water - Applying Solubility-Product Constants - Buffer solutions - Calculation of the pH of Buffer Solutions - The Henderson-Hasselbalch Equation - Properties of Buffer Solutions - Buffer capacity - Buffer preparation		
8	Effect of Electrolytes on Chemical Equilibrium	- The Effect of Ionic Charges on equilibrium - The Effect of Ionic Strength - Properties of Activity Coefficients - The Debye-Huckel Equation - Equilibrium Calculations Using - Activity Coefficients	13th	2
9	Principles of Neutralization titration	- Solutions and indicators for Acid/base titrations - Standard Solutions - Acid/Base Indicators - Examples of titrations: strong + strong , Strong + weak, Weak +weak - Titration curves	14th, 15th	4
10	Final Exam		16th	2
Total number of weeks and hours			**16**	**32**

Second: Practical/Tutorial/Clinical Aspects :

No.	Practical/Tutorial/Clinical topics	Week due	Contact Hours
1	Introduction to how to use the tools of analytical work	2nd	2
2	Preparation and standardization of HCl.	3rd	2
3	Application of acid base titration.	4th	2
4	Application of Mixtures titrations.	5th	2
5	Application of Redox titration.	6th	2
6	Application of precipitation titration.	7th	2
7	Application of Complex titration.	8th	2
8	Application of non-aqueous titration.	9th	2
9	Determination of Vitamin C.	10th	2
10	Preparation of Buffer solutions.	11th	2
11	Titration curves: 1-Strong acid & Strong base 2-Weak acid & Strong base 3-Strong acid & Weak base.	12th	2
12	Final Practical Exam	13th	2
Total number of weeks and hours		12	24

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