



## Module (Course Syllabus) Catalogue 2023-2024

<b>College/ Institute</b>	<b>Erbil Technology College</b>	
<b>Department</b>	<b>Petroleum Technology</b>	
<b>Module Name</b>	<b>Analytical Chemistry</b>	
<b>Module Code</b>	<b>ANC204</b>	
<b>Semester</b>	<b>Second</b>	
<b>Credits</b>	<b>7</b>	
<b>Module type</b>	<b>Prerequisite</b> <input type="checkbox"/>	<b>Core</b> <input checked="" type="checkbox"/> <b>Assist.</b> <input type="checkbox"/>
<b>Weekly hours</b>	<b>5</b>	
<b>Weekly hours (Theory)</b>	<b>( 2 )hr Class</b>	<b>( 80 )hr Workload</b>
<b>Weekly hours (Practical)</b>	<b>( 3 )hr Class</b>	<b>( 95 )hr Workload</b>
<b>Lecturer (Theory)</b>	<b>PhD. Yousif Taha Maarooof</b>	
<b>E-Mail &amp; Mobile NO.</b>	Yousif.maarooof@epu.edu.iq Yousif.taha89@gmail.com 00964 750 483 2218	
<b>Lecturer (Practical)</b>	<b>PhD. Yousif Taha Maarooof</b>	
<b>E-Mail &amp; Mobile NO.</b>	Yousif.maarooof@epu.edu.iq Yousif.taha89@gmail.com 00964 750 483 2218	

# Course Book

<p><b>Course Description</b></p>	<p>The lectures are divided on five weekly hours. Mainly, the first two hours will be dedicated for the topic backgrounds and the main principles. Notes and handouts are given to the students containing the detail of the topics. This will be assisted by presentations using word and/or power point slides during the lecture time. Discussion time is provided for the students for questions. Each student at the end of the course must be preparing a report about any titration methods other than that mentioned or discussed during the course. This report includes Theory, principle and discussion on the selected technique how it helps to improve the understanding of the principles.</p> <p>The second part of the week which is three hours, Practical time in which practical Experiment are given to the tutees and they participate in running the experiment by using ( Glassware, Balances, oven, Furnace, PH meter, Conductivity meter, chemicals, sent figure , and water bath) instrumentals in the lab. This is expected to enhance in broadening their ability to solve practical problems similar to real world problems. The practical time let the students work in groups.</p>
<p><b>Course objectives</b></p>	<p>This course provides an introduction to the fundamental principles of chemical analysis It will teach you how to correctly handle and interpret experimental measurements; you will also learn how to perform an analytical procedure like volumetric analysis.</p>
<p><b>Student's obligation</b></p>	<p>Missed classes will not be compensated including the quizzes and the scheduled assignments. The students will lose marks on unattended classes with quizzes unless a legal document or authorized leave is presented which should explain the excuse of the absence. However, the absent student should take the responsibility for making up the missed lecture.</p>
<p><b>Required Learning Materials</b></p>	<p>In Theory lecture we use Datashow to shown presentation (PPT), and White board to calculate the mathematical question. In Practical lecture we use Datashow, and White board.</p>
<p><b>Assessment scheme</b></p>	<p>16% Mid Term (Theory and practical) 4% Quiz 40% Assignment (report, paper, homework, seminar..) 25% final practical 15% final theory</p>
<p><b>Specific learning outcome:</b></p>	<p>1-Define any of the terms used in the course, for example: mole, molarity, percentage, chemical stoichiometry, etc.</p>

	<p>Students get expert about to (Glassware, Balances, oven, Furnace, PH meter, Conductivity meter, chemicals, and water bath) instrumentals in the lab.</p> <p>2- Change theoretical information about concentration to calculation.</p> <p>3- Apply calculate data to practical preparation of solution.</p> <p>4- Distinguish between acid-base reaction and redox reaction, molarity and molality, Strong electrolyte and Weak electrolyte, etc.</p> <p>5- The Students expected to enhance in broadening their ability to solve practical problems similar to real world problems.</p> <p>6- Choose the chemical information which, use to evaluate of detections crude oil.</p>	
<b>Course References:</b>	<p>The student can find additional information and examples in the following references:</p> <ol style="list-style-type: none"> <li>1. Modern Analytical Chemistry; by David Harvey.</li> <li>2. Fundamentals of Analytical Chemistry; Eighth Edition, by Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch.</li> <li>3. Principles and Practice of Analytical Chemistry, Fifth Edition, by F.W. Fifield and D. Kealey.</li> <li>4. Vogel's, Textbook of Quantitative Chemical Analysis, Fifth Edition, G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney.</li> <li>5. Quantitative Chemical analysis, Seventh Edition, -Daniel C. Harris.</li> </ol>	
<b>Course topics (Theory)</b>	<b>Week</b>	<b>Learning Outcome</b>
introduction to chemistry, division of chemistry	1	Identify types of chemical branches.
General introduction to analytical chemistry A. Qualitative analysis B. Quantitative analysis	2	Show the difference between quality and quantity analysis.
Units for expression Concentration, Molarity and Formality	3	Solve concentration problems involving Molarity and Formality.
Units for expression Concentration, Normality and Molality	4	Solve concentration problems involving Normality and Molality.

Units for expression Concentration, Weight, Volume and Weight-to- Volume Ratios , ppm ,and ppb.	5	Solve concentration problems involving Weight, Volume and Weight- to- Volume Ratios , ppm ,and ppb.
Converting Between concentration Units	6	Explain the difference between Units for expression Concentration when making scientific measurements, and calculate Converting Between concentration Units.
Volumetric Methods of Analysis, Titration, Volume as a signal and Titration Curves	7	Organise of glassware which, use to titration. As well as give knowledge about volumetric terms.
Aqueous solution, General concept of aqueous solutions.	8	Given the types of solution, and classify the aqueous solutions.
Ph Scale, Polyprotic Acids	9	Given the concentration of a strong acid or strong base, calculate the $[H_3O^+]$ , $[OH^-]$ , pH and POH of the solution
Chemical stoichiometry	10	Perform stoichiometric calculations on reactions involving reactants/products in solution (using molar concentrations) or reactions.
Buffers	11	Distinguish acid-base substance, and acid base buffers.
Oxidation - reduction	12	Determine oxidation states and balance any redox reaction that occurs under acidic conditions.
<b>Practical Topics</b>	<b>Week</b>	<b>Learning Outcome</b>
Safety in the chemistry laboratory.	1	Describe the sing of chemical substance, and given more information about chemical, and glassware safety.

Desk apparatus and unit operation for analytical chemistry.	2	Show the apparatus and unit operation for analytical chemistry.
Analysis of group I (silver group) Unknown test for group I (1)	3	Detection of silver, mercury, and lead from synthesized samples.
Analysis of group I (silver group) Unknown test for group I (2)	4	Detection of silver, mercury, and lead from real samples.
Practical quiz of silver group	5	
Weighting process Balances and Their Use in the Chemistry Laboratory	6	Describe how can weight of chemical substance by sensitive balance.
Preparation of solution 1- Solid solution. 2- Liquid solution.	7	Distinguish between preparation of solid and liquid solution.
An introduction to titrimetric methods of analysis and preparation of solutions  Preparation and standardization of 0.1 N HCl solution	8	Given the names of reactants and products in a chemical reaction, write the balanced equation.
Determination of Acetic acid in vinegar.	9	Distinguish between weak acid and strong acid. As well as discover the range of Acetic acid in vinegar.
Standardization of AgNO <sub>3</sub> solution by using NaCl standard solution by Mohr's method.	10	Determination of precipitation reaction.
Preparation and standardization of potassium permanganate (KMnO <sub>4</sub> ) solution.	11	Determine oxidation states and balance any redox reaction.
Determination of water hardness.	12	Determination of complex reaction, and discover ratio hardness in water.

## Questions Example Design

**1. Compositional:** In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....?, Calculate.....

For example

- What is the difference between Strong electrolyte & Weak electrolyte, and explain by examples?
- Calculate the molar concentration of K<sup>+</sup> in a solution that has a pK of 3.698.

## 2. *True or false type of exams:*

In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence.

For example

- The study of processes that take place of organisms is Physical Chemistry.( False)
- When gas or solid material dissolve in a liquid is a gas or solid material is the solute. (True )

## 3. *Multiple choices:*

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase.

For example

The study of processes that take place of organisms is.....chemistry.

A)Bio            B) Physical            C) Analytical            D) None of them

## **Extra notes:**

## **External Evaluator**