Course Description Form

1. Course Name:
Analytical Chemistry
2. Course Code:
APD-1204
3. Semester / Year:
second semester/ 2024-2025
4. Description Preparation Date:
15/1/2025
5. Available Attendance Forms:
Full time (theoretical lecture + practical) weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
150 hours – 6 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Elaf Abdul wahab Shihab Ahmed **Email:** elafshihab@uodiyala.edu.iq
8. Course Objectives
The module aims to teach students the basics of quantitative analytical chemistry (it includes lectures on volumetric analytical chemistry as well as teaching students about gravimetric analysis and instrumental analysis) in addition to the practical aspect that includes teaching students safety rules in the laboratory and explaining the tools and devices used in the laboratory. The curriculum also aims to teach students how to preparation of standard solutions and how to conduct experiments related to volumetric analysis
9. Teaching and Learning Strategies

- exams in each lecture, with reports in the laboratory part.
- Lecture method and use of the board.
- Explanation and clarification.
- Providing the students with basics and additional topics that related to the outcomes of chemical thinking and analysis.
- Creating discussion groups during lectures to discuss chemistry topics that require thinking and analysis.
- Asking students a set of thinking questions during lectures, such as what, how, when, and why for specific topics.
- Giving students homework that requires self-explanation in explained ways.

10. Course Structure

Theoretical part

Week	Hours	Required learning outcomes	Unit or Subject	Learning Method	Evaluation Method
1	2	Introduction to analytical chemistry, identifying its types (qualitative and quantitative) and explaining each one, and Methods of expressing concentrations (molarity, normality, molality, and mole fraction	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
2	2	Expressing the laws of v/v% , w/w % ,ppm and dilution laws with examples	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
3	2	Neutralization reactions of acids and bases	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
4	2	Calculating the pH in solutions of acids, bases, salts and buffer solutions	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
5	2	First exam	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
6	2	Derivation of the graph for the reaction of an acid and a base	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
7	2	Precipitation Titration and explain Mohr, Volhard and Fajan method	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
8	2	Titration of Complex formation	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
9	2	Titration of oxidation and reduction	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
10	2	Second exam	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
11	2	Measurement methods in gravimetric	Analytical Chemistry	Lecture Dialogue & discussion	Daily, monthly and final exams

		analysis		Brainstorming	and daily reports
12	2	Instrumental analysis, learning about Beer-Lambert's law, and the spectrometer, with questions.	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
13	2	Third exam	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
14	2	nucleic acids-biological roles-nucleotides-function of nucleotide-structure-classification	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports
15	2	3rd exam	Analytical Chemistry	Lecture Dialogue & discussion Brainstorming	Daily, monthly and final exams and daily reports

Practical part

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	3	Laboratory safety rules	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
2	3	Tools and equipment used in analytical chemistry laboratory	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
3	3	Introduction to Quantitative Analytical Chemistry	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
4	3	Methods of expressing concentrations in volumetric analysis	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
5	3	Preparation of standard solutions	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
6	3	Determination the concentration of a hydrochloric acid solution (HCl) by titrating it with a standard solution of sodium hydroxide (NaOH).	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
7	3	Preparation of (0.1N) HCl solution and standardization of it with sodium carbonate Na_2CO_3	Analytical Chemistry	Observation Dialogue & discussion	Daily, monthly and final exams and daily reports
8	3	Determination Acidity of Vinegar	Analytical Chemistry	Computer 1	Observation Dialogue & discussion

9	**3**	**Determination the ratio of carbonates and bicarbonates in a mixture of them.**	**Analytical Chemistry**	**Dialogue & discussion**	**and final exams and daily reports**
10	**3**	**First exam**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**
11	**3**	**Preparation and standardization of (0.1N) of $AgNO_3$ solution by Mohr Method and Determination of chloridin soluble chloride**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**
12	**3**	**Titration of oxidation and reduction ($KMnO_4$ with $Na_2C_2O_4$)**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**
13	**3**	**Titration of oxidation and reduction (KIO_3 with $Na_2S_2O_3$)**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**
14	**3**	**Titration of Complex formation (EDTA with $CaCO_3$)**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**
15	**3**	**Second exam**	**Analytical Chemistry**	**Observation Dialogue & discussion**	**Daily, monthly and final exams and daily reports**

11. Course Evaluation

Examination
Monthly & daily exams with discussion questions inside the lecture .
The degree of participation in the questions related to the subject.

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	The book “Foundations of Analytical Chemistry” written by (Douglas A. Skoog and Donald M. West)
Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	Iraqi academic journal
Electronic References, Websites	