Course Specification
(Bachelor)

Course Title:	Analytical Chemistry 2
Course Code:	CEM 221
Program:	Chemistry (general and Indutrial Track)
Department:	Chemsitry
College:	College of Sciences Al Zulfi
Institution:	Majmaah university
Version:	TP-153
Last Revision Date:	14 December 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3H)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3th level/second year)					
4. Course General Description:					
This course provides basic knowledge and understanding of essential principles for volumetric and gravimetric. This course includes studying the principles of titration operation- the four types of titration reactions neutralization reactions, oxidation-reduction reactions – precipitation reactions and complex formation reactions). The course is also focus on the gravimetric chemical analysis technique (steps in gravimetric analysis- precipitation technique and the affecting factors). The course is also focus on giving students different titration (neutralization- oxidation-reduction – precipitation and complex formation), it also gives different experiments in gravimetric analysis.					
5. Pre-requirements for this course (if any):					
CEM 120					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
The main objectives are: 1- Identification the importance of quantitative analysis (volumetric and gravimetric concepts). 2- Studying the different calculations in volumetric and gravimetric analysis. 3- Solving problems related to chemical analysis and interpret analytical results 4- Recognition the concepts of gravimetric analysis and steps 5- Studying various forms of sediment					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30H	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**20**
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		**50 H**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Know the concept of quantitative analytical chemistry and its importance.**	**K.1**	**-Lectures. Discussions - Brainstorming**	**-Midterms exam - Quizzes - Homework - Final exam -Electronic exam Class exercises -**
1.3	**Explain different volumetric and gravimetric experiments and doing different**	**K.3**		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	calculations concerning with them			
2.0	**Skills**			
2.1	Demonstrate laboratory skills, proper safety procedures, and regulatory compliance in laboratory settings.	S.1	Practical section	Follow up experiments in the laboratory. Direct Observation in the lab-discussion
2.3	Communicate effectively orally and written using appropriate presentation formats for different issues with recipients of different types.	S3	-lectures (PowerPoint) and Video related to the topic. - Discussions - E-learning - Self-learning	MCQ / SEQ / WEEKLY ASSESSMENT / QUIZ / OSPE
3.0	**Values, autonomy, and responsibility**			
3.1	Self-development, assess own learning and performance and autonomously make decisions regarding self-development and/or tasks based on convincing evidence.	V.1	-Simulation programs -Cooperative work	- Practical tests -Practical reports - Note card -Research papers

C. Course Content

No	List of Topics	Contact Hours
1.	A general introduction in analytical chemistry and quantitative types of volumetric gravimetric	2
2.	Calibrations tie and calculate for the pH, and the evidence and reagents	2
3.	Titrimetric Methods of Analysis; Acid-base system, neutralization, titration curves, mixtures of strong and weak acids and bases, polyfunctional acids and bases, amphiprotic species, indicators and indicators theories)	4

4.	Complex metric titrations and their application	4
5.	Precipitation titrations (Mohr- Folhard and Fajan methods)	4
6.	Oxidation reduction titrations and applications	4
7-	Introduction to gravimetric analysis and gravimetric analysis steps	4
8-	Theoretical foundations of the deposition	2
	Practical Part	
	- Different titration experiments in neutralization reactions - Different titration experiments in Redox reactions - Different titration experiments in precipitation reactions (Mohr – Volhard and Fajan methods) - Different titration experiments in complex formation reactions - Experiments in gravimetric analysis	20
Total		50 H

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st Mid-term exam	7th	10%
2.	2nd Mid-term exam	12th	10%
3.	Homeworks and Quizzes	Continuous	5%
4.	Presentation	One/semester	5%
5.	Electronic exam	15th	10%
6.	Final exam (Practical)	17th-19th	20%
7	Final Theoretical exam	End of term	40%
	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Fundamentals of Analytical Chemistry, D.A.Skoog, D.M.West,F.J.Holler and s.R.Crouch, 8th ed., 2004, Brooks/Cole. - The Oxford Handbook of Quantitative Methods – Graduate.
Supportive References	Analytical Chemistry, "Theoretical and Metrological Fundamentals", k.Danzer, 1st ed.,2006, Springer.

Electronic Materials	https://bookboon.com/en/quantitative-analysis-ebook
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, E- learning, balckboard
Technology equipment (projector, smart board, software)	data show, Smart Board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Course Evaluation Survey Quality of Exam Survey
Effectiveness of Students assessment	Faculty	CLO Mapping with teaching & assessment. Course Blueprinting Grade Analysis Psychometric Analysis
Quality of learning resources	Peers	Grade Verification
The extent to which CLOs have been achieved	Faculty member / Quality assurance committee	Direct assessment outcome analysis Course report preparation
Other	Students	Course Evaluation Survey Quality of Exam Survey

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CHEMISTRY DEPARTENT
REFERENCE NO.	MEETING N 17
DATE	15-12-2024