



Course Specifications

Course Title:	Volumetric and Gravimetric Analytical Chemistry
Course Code:	4022133-3
Program:	Chemistry
Department:	Chemistry
College:	Faculty of Applied Science
Institution:	Umm Al-qura University

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A. Course Identification

1. Credit hours: 3hrs (2 theoretical + 1 practical)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 3 rd level / 2 nd year
4. Pre-requisites for this course (if any): General chemistry 1
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	X	70%
2	Blended		-
3	E-learning	X	30%
4	Distance learning		-
5	Other		-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	10
2	Laboratory/Studio	30
3	Tutorial	--
4	Others (E-learning, office hours, exams)	24
	Total	64

B. Course Objectives and Learning Outcomes

1. Course Description Volumetric and Gravimetric Analytical Chemistry course provide students with the necessary background of quantitative analysis of different compounds using different tools of analysis and its application.
2. Course Main Objective By the end of this course, the student should fully aware of: <ol style="list-style-type: none">1. Describe the theoretical principles of volumetric and gravimetric analysis.2. Familiar with statistical methods and solution concentration parameters in chemical measurements.3. Apply the procedures required for gravimetric analysis and factors which effect the precipitation process.4. Be further prepared for the necessarily rigorous sequence in chemistry courses need the volumetric and gravimetric analysis.5. Know difference between (co-precipitation and post-precipitation), (weight form and precipitate form) and the role of different precipitants.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Recognize the principles and requirements of different types of volumetric and gravimetric analysis in analytical chemistry.	K1
1.2	Describe different types of volumetric titrations (neutralization, precipitation, reduction-oxidation, complexometric).	K2
1.3	Identify the suitable condition of gravimetric analysis, precipitants types and its applications in removal of contamination.	K2
2	Skills :	
2.1	Apply the suitable Volumetric methods to determine the concentration of the analyte.	S1
2.2	Explain the specific steps of gravimetric analysis.	S1
2.3	Practice Volumetric and Gravimetric methods to identify the concentration of different types of analytes	S3
3	Values:	
3.1	Communicate effectively with lecturer and colleagues on solving analytical chemical problems.	V1
3.2	Work effectively both in a team, and independently to perform an specific experiment.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Classification and applications of quantitative analysis and solution concentration parameters.	2
2	The principles of volumetric analysis and statistical methods – neutralization titrations theory- pH measurements.	1 +1E
3	Buffer solutions, their working theory and their applications- Indicators in neutralization titrations and the applications of neutralization titrations in manufacture, pharmaceutical and biochemistry fields	1+1E
4	Precipitation theory, adsorption indicators, applications of precipitation titrations and titrations which include complexes formation.	2
5	Compleximetry titrations and their applications in water analysis and manufacture and reduction – oxidation (Redox) titrations and their applications.	2
6	Principles and requirements of gravimetric analysis.	2
7	Mid Term exam	2
8	Theoretical principles of precipitation and stages of saturated, supersaturated and solubility product, precipitation formation (nucleation, precipitate growth)	2+2E
9	Factors affecting the solubility of precipitate, precipitation from homogeneous solution and contamination of precipitates, types of contaminates (co-precipitation, post precipitation, surface adsorption)	2+2E
10	The methods of contaminates removing or minimizing, organic and inorganic precipitants, requirements and its application, calculation of gravimetric analysis.	2+2E
Total		26

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recognize the principles and requirements of different types of volumetric and gravimetric analysis in analytical chemistry.	Lectures	Exams
1.2	Describe different types of volumetric titrations (neutralization, precipitation, reduction-oxidation, compleximetric).	Lectures	Exams
1.3	Identify the suitable condition of gravimetric analysis, precipitants types and its applications in removal of contamination.	Lectures	Exams
2.0	Skills		
2.1	Apply the suitable Volumetric methods to determine the concentration of the analyte.	Lectures + problem solving	Exams
2.2	Explain the specific steps of gravimetric analysis.	Lectures + problem solving	Assignments +Exam
2.3	Practice Volumetric and Gravimetric methods to identify the concentration of different types of analytes	Lectures + practical experiments	reports +Exam
3.0	Values		
3.1	Communicate effectively with lecturer and colleagues on solving analytical chemical problems.	Group discussion	Observation of group's teamwork performance
3.2	Work effectively both in a team, and independently to perform a specific experiment.	Discussion+ practice	Write a report

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities	---	10%
2	Midterm exam	8	20%
3	Practical exam	11	30%
4	Final exam	12	40%
Total			100%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counseling and advice.
- Office hours: During the working hours weekly.
- Academic Advising for students

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, <i>Analytical Chemistry</i> , 7th edition, Springer (2014)
Essential References Materials	Lecture handouts available on the coordinator website. Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, <i>Analytical Chemistry</i> , 7th edition, Springer (2014)
Electronic Materials	<ul style="list-style-type: none">• http://www.chemweb.com• http://www.sciencedirect.com• http://www.rsc.org
Other Learning Materials	Not required

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none">• Classrooms capacity (30) students.• Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	Room equipped with computer and projector and TV.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Questionnaire (indirect)
Extent of achievement of course learning outcomes	Program Leader	Results data analysis (direct) and questionnaire (indirect)
Quality of learning resources	Course instructor	Questionnaire (indirect)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Quality committee and department counsel
Reference No.	1st meeting
Date	2022

Head of Chemistry Department

Dr Moataz Morad

