



T-104
2022

Course Specification



Course Title: **Chemistry of Gravimetric Analysis**

Course Code: **212 CHEM-3**

Program: **Bachelor in Chemistry**

Department: **Chemistry**

College: **College of Science**

Institution: **Jazan University (JU)**

Version: **T104 2022**

Last Revision Date: **5 January 2023**



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A. General information about the course:

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: Level 6
Year 2

4. Course general Description

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre-requisite
		Lec.	Prac.				
Chemistry of Gravimetric Analysis	212CHEM-3	2	2	3	2	6 th	211CHEM-3

Course objectives: They are to identify the following: -

- Basic principles, definitions, and classifications of gravimetric methods
- Theories, mechanisms, steps, and applications of precipitation gravimetry
- Gravimetric, solubility and solubility products calculations
- Types of impurities in precipitates and their minimization.
- Determination of different cations and anions using precipitation gravimetry.

Syllabus: A-Theoretical contents.

Basic principles, definitions, and classifications of gravimetric methods. Theories, mechanisms, steps, advantages, disadvantages, and applications of precipitation gravimetry. Different calculations such as gravimetric calculations, solubility, solubility products, amount of precipitating agent and pH at which precipitation start and complete. Impurities in precipitates and their minimization. Precipitation from homogeneous solutions. Evaluating Precipitation Gravimetry, Scale of operation, Accuracy, Sensitivity, and specificity of gravimetric analysis.

Syllabus: B-Practical contents.

Selected experiments related to gravimetric analysis.

5. Pre-requirements for this course (if any): 211CHEM-3

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

The course is designed to study the basic principles and experimental applications of some gravimetric especially precipitation gravimetry.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	22	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	44

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding ; (Upon completion of the course, student will be able to)			
1.1	Demonstrate a broad understanding and critical view of the principles, classification and application of precipitation gravimetry. (I)	K(1.1)	Lecture/ discussion	Written examinations and quizzes (Objective Questions)
1.2	Describe correctly the essential facts, principles	K(1.2)	Lecture/ discussion	Written examinations and



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	and theories dealing with precipitation gravimetry			quizzes (Objective Questions)
2.0	Skills ; (Upon completion of the course, student will be able to)			
2.1	Demonstrate ability in critical thinking, numeracy, analytical reasoning, use graphs, charts for solving problems related to precipitation gravimetry(I)	S(2.1)	Lecture/ discussion	Written examinations, HWand quizzes (Problem-solving exercises& Essay question)
2.2	Apply their experimental basics and skills to use laboratory equipment, and classical techniques for carrying out experiments in various fields of precipitation gravimetry and to write a report representing the scientific data.(I)	S(2.2)	Lab Work/ group Work	Practical Sheet (Objective Questions, essay Question) lab report rubric& Final Lab Exam
2.3	Examine lab safety background to follow proper procedures and regulations for safe handling and use of chemicals(I)	S(2.3)	lab demonstrations / hands- on student learning activities	Safety exam (Objective Questions)

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction, Types of gravimetric methods, Precipitation gravimetry, Theory and Practice Steps of precipitation, gravimetry, Calculations in precipitation gravimetry, solubility and solubility products constant.	4
2.	Saturation and Super saturation, Controlling Particle Size, Relative Supper Saturation (Von Weimarn's Ratio) Mechanism of precipitants formation, Homogeneous Nucleation, , Heterogeneous Nucleation	3
3.	Precipitation methods from Homogeneous solutions, precipitates improvement factors affecting solubility of precipitates.	3
4.	Types of precipitants, Colloidal state, Colloidal Suspension Mechanism, Controlling Colloidal state, Precipitants	3





5.	Organic Precipitants, Advantages and disadvantages of Organic Precipitants, Inorganic Precipitants	1
6.	Evaluating Precipitation Gravimetry, Scale of operation, Accuracy, Sensitivity and specificity of gravimetric analysis	2
7.	Volatilization Gravimetry, principal of Volatilization Gravimetry, Thermogravimetry, Particulate gravimetry, Separation methods, Filtration, Extraction, direct method and indirect method	4
8.	Revision	2
9.	Selected Experiments related to course topics	22
Total		44

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	3-8	2%
2.	Quiz	4-6	3%
3.	Midterm Exam	6-8	15%
4.	Lab Sheet	11	7%
5.	Lab Report	3-8	10%
6.	Final Practical Exam	11	10%
7.	Safety Exam	9-10	3%
8.	Final Exam	12-14	50%
9.	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	Analytical chemistry, Christian, Gary D., Purnendu K. (Sandy), Kevin A. Schug, 7th edition (2014)
Supportive References	Quantitative Chemical Analysis & Solutions manual by Daniel C. Harris, 2006.
Electronic Materials	<ul style="list-style-type: none"> • https://chem.libretexts.org/Under_Construction/Purgatory/Book%3A_Analytical_Chemistry_2.0_(Harvey)/08%3A_Gravimetric_Methods • https://chem.libretexts.org/Under_Construction/Purgatory/Book%3A_Analytical_Chemistry_2.0_(Harvey)/08%3A_Gravimetric_Methods/8.2%3A_Precipitation_Gravimetry



	<ul style="list-style-type: none"> https://chem.libretexts.org/Under_Construction/Purgatory/Book%3A_Analytical_Chemistry_2.0_(Harvey)/08%3A_Gravimetric_Methods/8.3%3A_Volatilization_Gravimetry https://chem.libretexts.org/Under_Construction/Purgatory/Book%3A_Analytical_Chemistry_2.0_(Harvey)/08%3A_Gravimetric_Methods/8.4%3A_Part particulate_Gravimetry
Other Learning Materials	Tutorial videos and pictures. Some course contents and materials are posted on Black board sites

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students 1 Lab room(s) for groups of 25 students
Technology equipment (projector, smart board, software)	Smart board, Data show, Black board, internet
Other equipment (depending on the nature of the specialty)	Laboratory glassware and equipment such as Erlenmeyer flasks watch glass, graduated cylinder, volumetric flask, graduated pipette, volumetric burette and beakers, water bath, magnetic stirrer, Electronic balance and hot plate

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey (CES) Indirect
Effectiveness of students assessment	Instructor&Course coordinator	Class room evaluation (direct & indirect)
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Chemistry Department Council CHEMS2301
REFERENCE NO.	CHEMS230104
DATE	11/1/2023G – 18/06/1444H

H. Attachments

1- Practical Work

No	Title of Experiment	Tools, Chemicals, and equipment Needed in Experiments	# of Weeks
1	Laboratory safety, glassware and tools used in gravimetric analysis.	Drying oven, Muffle Furnaces, crucible burette, graduated cylinders, Volumetric flasks, pipettes and conical flasks, water bath, Hot plates, Crucibles, Balances, Water distillation, water deionizer equipments and pH meters	1
2	Basic concepts, terminology and gravimetric calculations.	-	1
3	Determination of the number of water of crystallization in barium chloride dihydrate	Glassware, Oven, Crucibles, Barium chloride dihydrate and Analytical balance.	1
4	Gravimetric analysis of sulphate as BaSO_4	Glassware, Oven, filtration system, sodium sulphate, hydrochloric acid, barium chloride	1
5	Gravimetric determination of calcium as calcium Oxide.	Glassware, Furnace, filtration system, hydrochloric acid, calcium salt, ammonia solution, ammonium oxalate.	1
6	Gravimetric determination of nickel as nickel dimethylglyoxime	Glassware, Oven, filtration system, hydrochloric acid, nickel chloride, dimethylglyoxime and ammonia solution	1
7	Gravimetric determination of lead as lead chromate	Glassware, Oven, filtration system, hydrochloric acid, lead nitrate, potassium chromate, acetic acid, and sodium acetate	1
8	Gravimetric determination of iron as ferric oxide	Glassware, Furnace, filtration system, hydrochloric acid, ferrous sulphate, nitric acid, ammonium hydroxide and ammonium nitrate	1
9	Revision		1
10	FINAL EXAM		1



2- Blue Print

Course Name	Chemistry of Gravimetric Analysis
Course Code	212CHEM-3

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2
Marks	30	24	16	27	3	--	-	---

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (30M)	Quiz	Objective test	2	1	1
			Mid term	Objective test	14	7	7
			Final Exam	Objective test	22	22	22
	K2	1.2 (24M)	Quiz	Essay Test	1	1	1
			Mid term	Essay Test	2	5	5
			Final Exam	Essay Test	3	18	18
Skills	S1	2.1 (16M)	H.W	Solving Problems	4	2	2
			Quiz	Solving Problems	1	1	1
			Mid term	Solving Problems & Essay question	2	3	3
			Final Exam	Solving Problems & Essay question	4	10	10
	S2	2.2 (27M)	Practical Sheet	Objective test	8	4	4
				Essay question	3	3	3
			Lab Report	Lab report rubrics	10	10	10
			Final Lab Exam	I Task experiment	1	10	10
	S3	2.3 (3M)	Safety EXAM	Objective test	6	3	3
TOTAL		100					100

