



Course Specifications

Course Title:	Chemistry of Gravimetric Analysis
Course Code:	CHEM 212
Program:	Bachelor in Chemistry
Department:	Chemistry
College:	College of Science
Institution:	Jazan university (JU)

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A. Course Identification

1. Credit hours: 3 hr
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:
4. Pre-requisites for this course (if any):
None
5. Co-requisites for this course (if any):
None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom Lab.	30 30	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre-requisite
		Lec.	Prac.				
Gravimetric Analysis	CHEM 212	2	2	3	3	4 th	-

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.

Syllabus: B-Practical contents

Selected experiments related to gravimetric analysis

*See attachment

2. Course Main Objective

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

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding <i>Upon completing this course, student will be able to</i>	
1.1	Demonstrate a broad understanding and critical view of the principles, classification and application of precipitation gravimetry. (I)	K.1
1.2	Describe correctly the essential facts, principles and theories dealing with precipitation gravimetry. (I)	K.2
2	Skills : <i>Upon completing this course, student will be able to</i>	

CLOs		Aligned PLOs
2.1	Demonstrate ability in critical thinking, numeracy, analytical reasoning, use graphs, charts for solving problems related to precipitation gravimetry (I)	S.1
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
2.3	Examine lab safety background to follow proper procedures and regulations for safe handling and use of chemicals (I)	S.3
3	Values: <i>Upon completing this course, student will be able to</i>	
3.1	Work as a group leader in cooperation with other colleagues (I)	V.1

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	4
3	Precipitation methods from Homogeneous solutions, precipitates improvement factors affecting solubility of precipitates.	4
4	Types of precipitants, Colloidal state, Colloidal Suspension Mechanism, Controlling Colloidal state, Precipitants,	4
5	Organic Precipitants, Advantages and disadvantages of Organic Precipitants, Inorganic Precipitants	4
6	Evaluating Precipitation Gravimetry, Scale of operation, Accuracy, Sensitivity and specificity of gravimetric analysis	4
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.	30
Total		

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 <i>Upon completing this course, student will be able to</i>		
1.1	Demonstrate a broad understanding and critical view of the principles, classification and application of	Lecture / Group work discussion	Written examinations, HW and quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	precipitation gravimetry. (I)		
1.2	Describe correctly the essential facts, principles and theories dealing with precipitation gravimetry. (I)	Lecture / Group work discussion	Written examinations, HW and quizzes
2.0	Skills <i>Upon completing this course, student will be able to</i>		
2.1	Demonstrate ability in critical thinking, numeracy, analytical reasoning, use graphs, charts for solving problems related to precipitation gravimetry (I)	Lecture / Group work discussion	Problem-solving exercises / Closed-book / open-book tests
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)	Lab demonstrations / whole group and small group discussion	Practical assignments /laboratory reports
2.3	Examine lab safety background to follow proper procedures and regulations for safe handling and use of chemicals (I)	Lab demonstrations	Observation of practical skills / Safety exam / Practical assignments /laboratory reports
3.0	Values <i>Upon completing this course, student will be able to</i>		
3.1	Work as a group leader in cooperation with other colleagues (I)	lab demonstrations / whole group and small group discussion	Practical assignments /laboratory reports

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score	
.1	Homework	5	2%	
.2	Quiz	4	3%	
.3	Midterm Exam	11	15%	
.4	Practical work	Sheet	13	10%
		Lab report	10	2%
		Final Experiment	13	15%
		Activities and participation during Laboratory session	12	3%
.5	Quiz in safety	12	0%	

#	Assessment task*	Week Due	Percentage of Total Assessment Score
.6	Final Exam	15	50%
.7	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:

Instructor will be available for academic counseling on daily basis for at 2h/day during office hours. The office hours are listed in the instructor time table and delivered to students in the first lectures in each semester. E-Mail is delivered to students for any help.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Analytical chemistry, Christian, Gary D., Purnendu K. (Sandy), Kevin A. Schug, 7 th edition (2014)
Essential References Materials	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 - 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_Partuculate_Gravimetry
Other Learning Materials	Tutorial videos and pictures. Some course contents and materials are posted on Black board sites

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<i>1 Lecture room(s) for groups of 50 students 1 Lab room(s) for groups of 25 students</i>
Technology Resources (AV, data show, Smart Board, software, etc.)	<i>Smart board, Data show, Black board, internet</i>
Other Resources	Laboratory glassware and equipment such as Erlenmeyer flasks watch glass, graduated cylinder, volumetric flask,

Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	graduated pipette, volumetric burette and beakers, water bath, magnetic stirrer, Electronic balance and hot plate

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and Assessment	Student	Likert-type Survey (CES) Indirect
Extent of achievement of course learning outcomes	Instructor & Course coordinator	Class room evaluation (direct & indirect)
Quality of learning resources	Program coordinator	Indirect
Exam Quality assessment	Assessment committee	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	Chemistry Department Council
Reference No.	42 / 35 /102 112
Date	17 /09 /1442 Corresponding to 28 / 04 /2021

B-Practical contents

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, filtration system, Barium chloride dihydrate	1
4	Gravimetric analysis of sulphate as BaSO₄	Glassware, Oven, filtration system, sodium sulphate, hydrochloric acid, barium chloride	1
5	Gravimetric determination of calcium as calcium oxalate	Glassware, Oven, 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	Revision	-	1
9	Gravimetric determination of iron as ferric oxide	Glassware, Oven, filtration system, hydrochloric acid, ferrous sulphate, nitric acid, ammonium hydroxide and ammonium nitrate	1

10	Gravimetric determination of copper as copper oxide	Glassware, Oven, filtration system, hydrochloric acid, copper sulphate, phenolphthalein indicator and sodium hydroxide	1
11	Gravimetric determination of chloride as silver chloride	Glassware, Oven, filtration system, sodium chloride, nitric acid, silver nitrate	1
12	Gravimetric determination of chloride as silver chloride	Glassware, Oven, filtration system, sodium chloride, nitric acid, silver nitrate	1
13	Gravimetric determination of magnesium as magnesium pyrophosphate	Glassware, Oven, filtration system, hydrochloric acid, magnesium sulphate, ammonium chloride, ammonia solution, sodium phosphate and methyl red	1
14	Revision	-	1
15	FINAL EXAM		1