



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Volumetric and Gravimetric Analytical Chemistry

4022133-3

**Course Specifications
(CS)**





Course Specifications

Institution: Umm Al-qura University	Date of Report: 2017
College/Department : Faculty of Applied Science/ department of chemistry	

A. Course Identification and General Information

1. Course title and code: Volumetric and Gravimetric Analysis Chemistry/ 4022133-3			
2. Credit hours: 4 hrs (2 theoretical + 1 practical).			
3. Program(s) in which the course is offered. Chemistry and Industrial Chemistry			
4. Name of faculty member responsible for the course: Dr. Marwa El Ghalban			
5. Level/year at which this course is offered: 3rd level / 2rd year			
6. Pre-requisites for this course (if any): General chemistry1			
7. Co-requisites for this course (if any)---			
8. Location if not on main campus: both on El-Abdyah, and El-Zaher			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input checked="" type="checkbox"/>	What percentage?	100%
b. Blended (traditional and online)	<input type="checkbox"/>	What percentage?	
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. Other		What percentage	
Comments:			



B Objectives

<p>1. What is the main purpose for this course?</p> <p>1.1. Know the theoretical principle of volumetric and gravimetric analysis.</p> <p>1.2. Familiar with statistical methods and solution concentration parameters in chemical measurements</p> <p>1.3. Study the procedures required to gravimetric analysis and factors which effect the precipitation process</p> <p>1.4. Classify varies titrations and their applications in water analysis and manufacture</p> <p>1.5. Using different indicators and pH control in the different titrations</p> <p>1.6. Compare between Mohr, Volhard and Fajans methods in precipitation titrations</p> <p>1.7. Know difference between (co-precipitation and post-precipitation), (weight form and precipitate form) and the role of different pricipitants</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <p>The students will be mentioned to prepare an essay or a report from literature using the library, data base services, and/or websites to follow up and update the new topics of the subject of the course</p>

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
a. Classification and applications of quantitative analysis and solution concentration parameters	1	2
b. The principles of volumetric analysis and statistical methods – neutralization titrations theory- pH measurements.	1	2
c. 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	2
d. Precipitation theory, adsorption indicators, applications of precipitation titrations and titrations which include complexes formation	1	2
e. Compleximetry titrations and their applications in water analysis and manufacture and reduction – oxidation (Redox) titrations and their applications.	1	2
f. Principles and requirements of gravimetric analysis	1	2
g. Theoretical principles of precipitation and stages of saturated, supersaturated and solubility product, precipitation formation (nucleation, precipitate growth)	1	2
h. Mid Term exam	1	2



i. Factors affecting the solubility of precipitate, precipitation from homogeneous solution and contamination of precipitates ,types of contaminates (co-precipitation, post precipitation, surface adsorption)	1	2
j. The methods of contaminates removing or minimizing	1	2
k. Organic precipitants, requirements and its application Inorganic precipitants, requirements and its application	2	4
l. Calculations of gravimetric analysis	1	2
m. Revisions and preparatory exam	1	2

Laboratory Part:

- Standardization of hydrochloric acid using 0.1N sodium carbonate.
- Determination of sodium hydroxide and sodium carbonate in mixture using hydrochloric acid
- Determination of ammonia in ammonium solution using hydrochloric acid
- Standardization of potassium permanganate using oxalic acid
- Iodometry and Iodometry using sodium thiosulphate
- Silver nitrate titrations by Volhard and Mohr methods
- Standardization of EDTA using zinc sulphate
- Determination of water crystallization in barium chloride salt.
- Determination of barium ion as barium sulphate.
- Determination of aluminum in alum.
- Determination of calcium using ammonium oxalate
- Determination of lead as lead chromate
- Determination of nickel using dimethylglyoxime



2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	28	-	42			70
Credit	2	-	1			3

3. Additional private study/learning hours expected for students per week.	2 h
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
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	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		



	Recognize principles of volumetric and gravimetric analysis in analytical chemistry	<ul style="list-style-type: none"> • Lectures • Scientific discussion • Library visits • Web-based study 	<ul style="list-style-type: none"> • Exams • web-based student performance systems • portfolios • long and short essays • posters lab manuals
	Identify the classification of volumetric analysis methods		
	Know the analytical measurements and discover the suitable method and requirements for gravimetric analysis and purification		
	Outline the difference between nucleation, precipitate growth and define the concentration parameters		
	Recognize the meaning of indicators and identify the suitable condition of gravimetric analysis and removal of contamination		
	Describe statistical methods in analytical chemistry.		
	Familiar with neutralization titrations and with organic and inorganic precipitants, requirements and its applications		
	Select the proper method of precipitation titrations methods		
	Name the different reduction-oxidation methods		
	Know the principles of compleximetry titrations		
	Recognize the meaning of metalochromic indicators		
	Outline application important		
2.0	Cognitive Skills		
	<ul style="list-style-type: none"> • Apply the suitable methods to refer to concentration parameters • Compare the different types of volumetric analysis and predict the suitable methods for gravimetric analysis • Explain principles of volumetric methods and its classification. Choose the suitable method to purify the precipitate. • Analyze deferent solutions and pH measurements • Create the different ideas to study the precipitation process, contamination, purification • Appraise the volumetric and gravimetric methods in analytical chemistry • Demonstrate neutralization, redox, precipitation and compleximetry titrations and evaluate the types of precipitants and procedures for gravimetric analysis 	<ul style="list-style-type: none"> • Lectures • Scientific discussion • Library visits • Web-based study 	<ul style="list-style-type: none"> • Exams • web-based student performance systems • portfolios • posters • demonstrations
3.0	Interpersonal Skills & Responsibility		



	<ul style="list-style-type: none"> • Ability to work in a team to perform a specific experimental tasks. • Ability to work independently to handle chemicals • Ability to communicate results of work to classmate and participation in class or laboratory discussions 		<ul style="list-style-type: none"> • Ability to work in a team to perform a specific experimental tasks. • Ability to work independently to handle chemicals • Ability to communicate results of work to classmate and participation in class or laboratory discussions
4.0	Communication, Information Technology, Numerical		
	<ul style="list-style-type: none"> • Use information and communication technology. • The ability to use e-mail to communicate with the instructor and other students. • Scientific writing. • Use his/her observations to solve problems. • Able to calculate and discuss the facts and logical propose methods to solve the difficulties. • Ability to work in a team to perform a specific task. • Ability to solve problems. 	<ul style="list-style-type: none"> • Lectures • Scientific discussion • Library visits • Web-based study 	<ul style="list-style-type: none"> • web-based student performance systems • individual and group presentations
5.0	Psychomotor		
	Laboratory practice . including 1.Locate Materials Safety Data Sheets, chemicals carcinogens list, and hazardous chemicals list. 2. Handle chemicals safely with a proper PPE 3.Dilute solutions, repeat analysis and calculate true result for all procedures performed as required. 4.Pipette accurately at all times 5. Titrate and weight efficiently in right way 6.Dispose the hazardous solution in right way	Practical session should include both demonstration and experiments .	1.Repetition of the experiments , to reproduce the results 2.Written report of chart and procedures. 3.The students should be able to correlate their results with experimental conditions



5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Homework or activities.	--	10 %
2	Midterm Exam.	8	20 %
3	Practical Exam.	14	30 %
4	Final Exam. (2 hours exam)	16	40 %
5	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

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

E. Learning Resources

1. List Required Textbooks

- Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, *Analytical Chemistry*, 7th edition, Springer (2014)
- Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, *Analytical Chemistry*, 7th edition, WILEY (2014)

2. List Essential References Materials (Journals, Reports, etc.)

- Lecture Hand outs available on the coordinator website

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

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4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

- <http://www.chemweb.com>
- <http://www.sciencedirect.com>
- <http://www.rsc.org>

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required



Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- **Classrooms capacity (30) students.**
- **Providing hall of teaching aids including computers and projector.**

2. Computing resources (AV, data show, Smart Board, software, etc.)

- **Room equipped with computer and projector and TV.**

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- **No other requirements.**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
Complete the questionnaire evaluation of the course in particular.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor

- **Observations and the assistance of colleagues.**
- **Independent evaluation for extent to achieve students the standards.**
- **Independent advice of the duties and tasks.**

3 Processes for Improvement of Teaching

- **Workshops for teaching methods.**
- **Continuous training of member staff.**
- **Review of strategies proposed.**
- **Providing new tools for learning.**
- **The application of e-learning.**
- **Exchange of experiences internal and external.**

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- **Check marking of a sample of exam papers, or student work.**
- **Exchange corrected sample of assignments or exam basis with another staff member for the same course in other faculty.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for



improvement.

- **Periodic Review of the contents of the syllabus and modify the negatives.**
- **Consult other staff of the course.**
- **Hosting a visiting staff to evaluate of the course.**
- **Workshops for teachers of the course.**

Faculty or Teaching Staff: Dr. Marwa El Ghalban

Signature:  Date Report Completed: 12/1/2019

Received by: Dr. Ismail Althagafi Department Head

Signature:  Date: 20/1/2019

