

Kingdom of Saudi Arabia

The National Commission for

Academic Accreditation & Assessment



Course Specifications

Volumetric Analysis Chemistry

402112-3

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 Analysis Chemistry / 402112-3			
2. Credit hours: 3 (2+1) hrs.			
3. Program(s) in which the course is offered. Chemistry program			
4. Name of faculty member responsible for the course: Dr. Amr L Saber			
5. Level/year at which this course is offered: 3rd level / 2nd year			
6. Pre-requisites for this course (if any): General chemistry 402101			
7. Co-requisites for this course (if any)---			
8. Location if not on main campus: both on El-Abedyah, and El-Zaher			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input checked="" type="checkbox"/>	What percentage?	50%
b. Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	20%
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>
f. Other	<input checked="" type="checkbox"/>	What percentage?	30%
Comments:			

2

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1

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B Objectives

1. What is the main purpose for this course?
1.1. Know the theoretical principle of neutralization reactions-reduction oxidation reactions – compleximetric and precipitation titrations
1.2. Familiar with statistical methods and solution concentration parameters in chemical measurements
1.3. Classify various titrations and their applications in water analysis and manufacture
1.4. Using different indicators and pH control in the different titrations
1.5. Compare between Mohr, Volhard and Fajans methods in precipitation titrations
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)
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

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. Study the classification and applications of volumetric analysis	1	2
b. The analytical process and sample preparation	1	2
c. Using the statistical methods in analytical measurements	1	2
d. Units of solution concentrations and chemical calculations	1	2
e. The principles of volumetric analysis – neutralization titrations theory- pH measurements	1	2
f. Buffer solutions, their working theory and their applications	1	2
g. Indicators in neutralization titrations and the applications of neutralization titrations in manufacture, pharmaceutical and biochemistry fields	1	2
h. Precipitation theory and adsorption indicators	1	2
i. Applications of precipitation titrations and titrations which include complexes formation	1	2
j. Compleximetry titrations and their applications in water analysis and manufacture	1	2
k. Theory of Reduction – Oxidation (Redox) titrations	1	2
l. Different applications of Redox reactions	1	2

Practical Part:

- Standardization of hydrochloric acid using 0.1N sodium carbonate.
- Determination of sodium hydroxide using hydrochloric acid
- 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
- Determination of ferrous salt solution using potassium dichromate
- Iodometry and Ioditometry using sodium thiosulphate
- Silver nitrate titrations by Mohr method
- Silver nitrate titrations by Volhard method
- Standardization of EDTA using zinc sulphate
- Determination of total hardness (Ca^{+2} & Mg^{+2}) of water using EDTA
- General revision

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	24	-		36		60
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		
1.1	Recognize principles of volumetric 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
1.2	Identify the classification of volumetric analysis methods		
1.3	Know the analytical measurements		
1.4	Define the concentration parameters		
1.5	Recognize the meaning of indicators		
1.6	Describe statistical methods in analytical chemistry.		
1.7	Familiar with neutralization titrations		
1.8	Select the proper method of precipitation titrations methods		
1.9	Name the different reduction-oxidation methods		
1.10	Know the principles of compleximetry titrations		
1.11	Recognize the meaning of metalochromic indicators		
1.12	Outline application important		
2.0	Cognitive Skills		
2.1	Apply the suitable methods to refer to concentration parameters	<ul style="list-style-type: none"> • Lectures • Scientific 	<ul style="list-style-type: none"> • Exams • web-based
2.2	Compare the different types of volumetric analysis		

2.3	Explain principles of volumetric methods and its classification	discussion • Library visits • Web-based study	student performance systems • portfolios • posters • demonstrations
2.4	Analyze deferent solutions and pH measurements		
2.5	Summarize the principles of volumetric analysis		
3.0	Interpersonal Skills & Responsibility		
3.1	Illustrate the principles of volumetric methods and its classification	• Lectures • Scientific discussion • Web-based study	• Exams • web-based student performance systems
3.2	Analyze neutralization, redox, precipitation and compleximetry titrations		
4.0	Communication, Information Technology, Numerical		
4.1	Appraise the volumetric methods in analytical chemistry	• Lectures • Scientific discussion • Library visits • Web-based study	• web-based student performance systems • individual and group presentations
4.2	Demonstrate neutralization, redox, precipitation and compleximetry titrations		
5.0	Psychomotor		
5.1	NOT APPLICABLE		
5.2			

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	Exam	5-14	20%
2	Assignments		10%
3	Practical Exam	15	30%
4	Final Exam	16	40%

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
<ul style="list-style-type: none"> • Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, <i>Analytical Chemistry</i>, 7th edition, Springer (2014)
2. List Essential References Materials (Journals, Reports, etc.)
<ul style="list-style-type: none"> • Lecture Hand outs available on the coordinator website
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
<ul style="list-style-type: none"> • Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, <i>Analytical Chemistry</i>, 7th edition, WILEY (2014)
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)
<ul style="list-style-type: none"> • 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.)
<ul style="list-style-type: none"> • Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
2. Computing resources (AV, data show, Smart Board, software, etc.)
<ul style="list-style-type: none"> ▪ 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)
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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. Amr L Saber**

Signature:

Date Report Completed: 2017

Received by: **Dr Hatem Altass** Department Head

Signature: _____ Date: _____