



Course Specifications

Course Title:	Quantitative analysis-1
Course Code:	242CHEM-2
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	Science
Institution:	King Khalid University

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A. Course Identification

1. Credit hours:	3
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:	Level 4 / Year 2
4. Pre-requisites for this course (if any):	241CHEM-2
5. Co-requisites for this course (if any):	No co-requisite

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100 %
2	Blended	0	0
3	E-learning	0	0
4	Correspondence	0	0
5	Other	0	0

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	45
Other Learning Hours*		
1	Study	25
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	0
5	Others(specify)	0
	Total	45

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Actually, Analytical Chemistry includes two types; quantitative analysis and qualitative analysis. The quantitative analysis is a core of this course. In general, there are two methods: classical methods and modern methods. The classical methods are the mainstream of this course. The classical methods include Gravimetric analysis and Volumetric analysis; these two classical methods will be comprehensively covered in this course. The volumetric titrations are acid-base titration, complexometric titration, precipitation titration and redox titration. In addition, Statistics for Analytical Chemistry and Principles of Analytical Chemistry also will be covered in this course.

2. Course Main Objective

The aim of the course is to enable students to understand the quantitative methods of chemical analysis. The course emphasizes on basic concepts of volumetric and gravimetric methods of analysis. It includes recognizing the type of reactions, understanding chemical calculations, and designing titration curves used in quantitative analysis methods. In addition to descriptive statistics in Analytical chemistry.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	To gain the knowledge of the fundamental concepts and principles of quantitative analysis	K1, K2, K3
1.2	To understand the methods of quantitative analysis and their application in daily life.	K1, K2
2	Skills:	
2.1	To analyze, interpret and explain the practical application of the quantitative analysis based on the course topics.	S1, S2
2.2	To use the gained knowledge to explain the application of quantitative analysis, such as determination of water hardness.	S1, S2
3	Competence:	
3.1	To present an oral explanation for a subject in the field.	C1, C2, C3, C4
3.2	To interact positively with colleagues in a group work.	C2, C3, C4
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	C2
3.4	To summarize the literature and sources for a specific topic in the course.	C4

C. Course Content

No	List of Topics	Contact Hours
1	Principles of Analytical Chemistry (Analytical Chemistry Objectives and Applications) Environmental analysis; Biological analysis; Pharmaceutical analysis; Food analysis: Example from each field should be explained. What is Analytical Science? (Gary Christian P.1). Quantitative and Qualitative analysis: What does each tell us? (Gary Christian P.2).	5
2	Methods for Expressing Concentration W/W; V/V; W/V (%); M; N; ppm, ppb; moles [examples of conversion and calculation] 1-Numbers in Analytical Chemistry 2-Fundamental Units of Measure 3-Significant Figures 4-Units for Expressing Concentration Molarity and Formality Normality Molality 5- Weight, Volume, and Weight-to-Volume Ratios Converting Between Concentration Modern Analytical chemistry: Basic Tools of Analytical Chemistry (Harvey Christian P.11-18).	10

3	<p>Statistics for Analytical Chemistry</p> <p>1-Use of spreadsheet in analytical Chemistry (Gary Christian P.78)</p> <p>2-The mean, the median and the Standard Deviation</p> <p>3- Normal distribution of analytical data)</p> <p>Chapter 1: univariate data (Statistical methods in analytical Chemistry by Winefordner P. 13-27)</p> <ul style="list-style-type: none"> - Mean and Standard Deviation (Winefordner P.13) - The Most Probable Value (Winefordner P.1) - The Dispersion (Winefordner P.15) - Independency of Measurements (Winefordner P.21) - Reproducibility and Repeatability (Winefordner P.23) - Reporting the Results (Winefordner P.25) - Interpreting the Results (Winefordner P.27) - Linearity and correlation coefficient -Linear least squares- How to plot the right straight line (Gary Christian P.102) -Correlation Coefficient and Coefficient of determination (Gary Christian P.106) - Using Spreadsheets for plotting calibration curves (Gary Christian P.107) 	9
4	<p>Volumetric Analysis:</p> <p>1- Introduction and classification</p> <p>2- Preparation of standard solutions</p> <ul style="list-style-type: none"> - Volumetric Glassware- Also Indispensable (Gary Christian P.32) - Preparation of Standard base solutions (Gary Christian P.43) - Preparation of Standard acid solutions (Gary Christian P.44) <p>3-Acid-base titrations</p> <p>Chapter 8: Acid-Base titration (Gary Christian P.266-284)</p> <p>4- Reduction-oxidation titrations</p> <p>Chapter 14: Redox and potentiometric titrations (Gary Christian P.414-434)</p> <p>5-Precipitation titrations</p> <p>Chapter 11: Precipitation Reactions and titrations. (Gary Christian P.239-246)</p> <p>6-Complexometric titrations</p> <p>Chapter 9: Complexometric Reactions and titrations (Gary Christian P.294-303)</p>	15
5	<p>Gravimetric Analysis</p> <p>1-How to perform a successful gravimetric analysis? and Solutions preparation</p> <p>2- Precipitation: Super-saturation, Nucleation and Crystal-growth; Digestion of the precipitate and Types of impurities</p> <p>3- Drying or igniting the precipitate and gravimetric calculations</p> <p>Chapter 13: Gravimetric Analysis: (Gary Christian P.313-325)</p>	6

Total		45

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		
1.1	To gain the knowledge of the fundamental concepts of quantitative analysis	Lectures, interactive teaching sessions,	Written exams, electronic quizzes, and examinations
1.2	To understand the application of quantitative analysis in daily life.	Tutorials, problems solving sessions	
2.0	Skills		
2.1	To analyze, interpret and explain the practical application of the quantitative analysis based on the course topics.	Lectures, problem solving sessions	Written exams, oral exams
2.2	To use the gained knowledge to explain the application of quantitative analysis, such as determination of water hardness.	problem solving sessions	Oral discussion, written examinations
3.0	Competence		
3.1	To present an oral explanation for a subject in the field.	opened essays on selected topics	Class activities
3.2	To interact positively with colleagues in a group work.	Interactive teaching sessions	Oral presentation on a group report
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	Interactive teaching sessions and homework	Discussion within a group using Course Forums
3.4	To summarize the literature and sources for a specific topic in the course.	Discussing research articles	Reports and homework

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	5 th	5
2	quiz	8 th	5
3	Homework	15 th	10
4	Midterm exam-1	6 th	15
5	Midterm exam-2	11 th	15
6	Final exam	16 th	50

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

& separated from theory lecture with independent lecturer

E. Student Academic Counseling and Support

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

10 office hours are offered for students for individual consultations. Communications are available on-site, phone conversations, and chatting by social media.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol style="list-style-type: none"> Gary D. Christian, "Analytical Chemistry", 7th Edition, Wiley, 2014, ISBN 978-0-470-88757-8. Ibrahim Z. Al-Zamil, "Volumetric and Gravimetric Analysis", 2nd Edition, الناشر دار الخريجي للنشر والتوزيع، عام 1425هـ، رقم 9-013-45-9960
Essential References Materials	1. Analytical Chemistry 5th Ed. Solution manual by Gray Christian, 1994, John Wiley & Sons. In.
Electronic Materials	<u>NA</u>
Other Learning Materials	No other learning materials.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and computer lab
Technology Resources (AV, data show, Smart Board, software, etc.)	Accessible databases
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	---

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	Students	Questionnaire
	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
	Program Leader	Meetings
Course contents (update)	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
Quality of learning resources	External reviewers	Reports

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	Department counsel
Reference No.	1/22/142
Date	15-9-1442