



Course Specification

(Bachelor)

Course Title: Fundamentals of Analytical Chemistry

Course Code: CHEM 252

Program: Bachelor

Department: Chemistry

College: College of Science

Institution: King Saud University

Version: TP-153 BSc

Last Revision Date: 05, May 2025



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A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 + 1)

3 (2 Lecture + 1 Practical)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others

B. ☒ Required ☐ Elective

3. Level/year at which this course is offered:

3rd / 2nd

4. Course general Description:

This course conducting together with the laboratory experiments to cover the basic principles and general concepts of the traditional analytical chemistry.

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

CHEM 101

6. Co-requirements for this course (if any):

None

7. Course Main Objective(s):

To learn the basic principles of analytical chemistry, including qualitative and quantitative analysis, concentration expressions and calculations, and titrations in analytical chemistry.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	56	100%
2	E-learning		
3	Hybrid - Traditional classroom - E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1	Lectures	30
2	Laboratory/Studio	26
3	Field	
4	Tutorial	
5	Others (specify)	
Total		56

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			
1.1	To describe the fundamental principles of analytical chemistry	K1	Student discussion Visualization	Quizzes Midterm exam Final exam
1.2	To recognize the types of chemical equilibrium, titration, and their applications	K2	Visualization Brainstorming Laboratory experiments	Practical assessment activities Midterm exam Final exam
2.0	Skills			
2.1	To calculate the concentration and pH values of solution in various sample matrices	S2	Brainstorming Collaborative learning Laboratory experiments	Quizzes Homework Midterm Exam Final exam Practical exam Practical assessment activities
2.2	To demonstrate appropriate safety techniques and proper use of lab materials and equipment	S6	Visualization Laboratory experiments	Practical assessment activities Practical exam
3.0	Values, autonomy, and responsibility			
3.1	To demonstrate the ability to work in a group to solve chemistry problems effectively	V2	Flipped class Laboratory experiments	Homework Presentation Practical assessment activities

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to analytical chemistry	1
2	Steps and stages of analytical chemistry process	1
3	Chemical Concentration expression	2
4	Chemical solutions preparation	1
5	Introduction to volumetric analysis and titrations	1
6	Acid- base equilibrium and pH measurements	4
7	Acid - Base titrations	8
8	Precipitation reactions and titrations	4
9	Complexations reactions and titrations	4
10	Redox reactions and titrations	4
Total		30

No	List of Topics (Practical Part)	Contact Hours
1	Laboratory safety and protocol, preparation of hydrochloric acid	2
2	Titration of sodium hydroxide against standard of hydrochloric acid Titration of sodium carbonate against standard of hydrochloric acid	2
3	Titration of acetic acid against standard of sodium hydroxide Titration of phosphoric acid against standard of sodium hydroxide	2
4	Titration of mixture of sodium carbonate and sodium hydroxide against standard of hydrochloric acid	2
5	Precipitation titration: Mohr's methods	2
6	Precipitation titration: Volhard's methods	2
7	Complexation titration: Determination of water hardness using complexometric titration	2
8	Redox titrations: Titration of unknown oxalic acid solution using potassium permanganate	2
9	Redox titrations: Titration of unknown Fe(II) solution using potassium dichromate	2
10	Redox titrations with iodine: Titration of unknown iodine solution using sodium thiosulphate	2
11	Redox titrations with iodine: Estimation of Cu(II) using sodium thiosulphate solution (Iodometrically)	2
12	The gravimetric analysis	2
13	The gravimetric determination of Nickel	2
Total		26

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Midterm exams	Weeks 7-8	20
2	Laboratory quizzes and practical exams	7 & 14	20
3	Laboratory reports	Weekly	10
4	Assignments (discussion, quizzes, homework's, and presentation)	Weekly	10
5	Final exam	Week 16	40

*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	D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, "Fundamentals of Analytical Chemistry", 10th Ed., Brooks Cole, Cengage Learning, 2022.
Supportive References	-Ibrahim Al-Zamil, "Analytical Chemistry, Instrumental Analysis", 5th Ed., Al-Khriji Publisher, 2015. -Ibrahim Al-Zamil, M.A. AlHajjaji, Saad Al-Tamrah, M. Banah, "Analytical Chemistry, Gravimetric and Volumetric Analysis", 4th Ed., Al-Khriji Publisher, 1432. -Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug, "Analytical Chemistry", 7th Ed., 2013, Wiley, USA.
Electronic Materials	-All lecture notes will be available on the web site of the course teacher. - https://youtu.be/87SGsUOX5k8?si=iHaNGemSLZNizUdf
Other Learning Materials	-College library contains all required references including additional materials that support the course content. -Digital libraries include many journals, e-books, and periodicals are available for students.

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom Analytical Chemistry laboratory
Technology equipment (Projector, smart board, software)	Classrooms and laboratories are equipped with desktop computers, data show, smart board, and high-speed internet access
Other equipment (Depending on the nature of the specialty)	Laboratories contain chemicals, glassware, and related equipment

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students' assessment	Faculty	Direct
Quality of learning resources	Faculty and program leaders	Direct
The extent to which CLOs have been achieved	Faculty and program leaders	Direct
Other		

Assessors: Students, Faculty, Program Leaders, Peer Reviewer, Others; specify.

Assessment Methods: Direct, Indirect.

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	05/05/2025