هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrochemical Analysis
Course Code:	ICHM351-3
Program:	Bachelor of Science in Industrial Chemistry
Department:	Department of Physical Sciences
College:	College of Science
Institution:	Jazan University
Version:	TP-153 (2024)
Last Revision Date:	17 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3hr)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		

3. Level/year at which this course is offered: (5th / 3rd)

4. Course general Description:

Course title	Course code	Contact Hours			Credit Hours	Year	Level	Prerequisite	Co-requisite
		Lec	Tut	Lab					
Electrochemical Analysis	ICHM351-3	2	-	2	3	3rd	5th	CHEM243-3	-

This course aims to provide students with the basic principles, concepts, terminologies, theoretical aspects, and practical skills of the electro-analytical methods and their application in chemical analysis

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

CHEM243-3

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

None

7. Course Main Objective(s):

1. Recognizing the concepts, terminologies, classification, and applications of electro-analytical methods
2. Understanding the theoretical aspects and instrumentation of the electro-analytical methods.
3. Acquiring the practical skills required to use different electro-analytical methods in chemical analysis.
4. The ability to think critically to develop and validate electro-analytical methods
5. Understanding how to evaluate, treat, analyze, and interpret the analytical data obtained.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15 =60	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**	$2 \times 15 = 30$
2.	**Laboratory/Studio**	$2 \times 15 = 30$
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

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;** Upon completion of the course, students are able to:			
1.1	**Demonstrate a comprehensive understanding of principles, concepts, and terminology of electro-analytical methods (M)**	**K1**	**lecture/discussion/Seminars/presentation**	**oral and written examinations/ laboratory reports**
1.2	**Describe and explain correctly the chemical phenomena of electro-analytical methods and practical procedures of their applications in chemical analysis (M)**	**K2**	**lecture/discussion/Seminars/presentation**	**oral and written examinations/ laboratory reports**
2.0	**Skills;** Upon completion of the course, students are able to:			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Identify and solve problems using appropriate principles, methodologies, and tools, related to electro-analytical methods and practical procedures of their applications in chemical analysis (M)**	**S1**	**lecture/discussion/Seminars/presentation**	**oral and written examinations/ laboratory reports**
2.2	**Carry out chemical experiments, analyze data, and report results related to the practical use of electro-analytical methods in chemical analysis correctly (M)**	**S2**	**Lab work, group work**	**Lab report/ Lab notebook.**
2.3	**Apply the proper procedures and regulations for the safe handling, use, and disposal of chemicals during the use of electro-analytical methods in chemical analysis (M)**	**S4**	**Lab demonstrations / hands-on student learning activities**	**Safety exam**
2.4	**Clearly communicate the results of scientific work in the field of electro-analytical methods (M)**	**S5**	**Presentation /reports**	**Oral presentation /reports**
3.0	**Values, autonomy, and responsibility;** Upon completion of the course, students are able to:			
3.1	**Working as a group leader in cooperation with other colleagues. (M)**	**V1**	**lab demonstrations / whole group and small group discussions**	**group project reports / Practical assignments and laboratory reports**

C. Course Content

1- Theoretical Part

No	List of Topics	Contact Hours
1.	Introduction to instrumental methods of analysis	1
2.	Fundamentals of electrochemistry: oxidation-reduction reactions, electrochemical Cells	4
3.	Nernst Equation: effect of concentration on potential, electrode potential, cell potential.	2
4.	Potentiometry, reference electrodes, indicator electrodes, Ion-selective electrodes.	4
5.	Potentiometric titrations	2
6.	Bulk Electrolysis: electrogravimetry	2
7.	Coulometry and coulometric titrations	2
8.	Conductometry and conductometric titrations	2
9.	Voltammetry, voltammetric cell, kinds of voltammetry	4
10.	Polarography, polarographic cell, kinds of Polarography	4
11.	Amperometry and amperometric titration	2
12.	Selecting, evaluating, and validating the electro-analytical methods	1
	Total	$2 \times 15 = 30$

2- Lab work

Practical experiments to use electro-analytical methods in chemical analysis

Total	$2 \times 15 = 30$

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Periodic Exams*	*6-8*	*15%*
2.	*Assignments & Classroom activities*	*During semester*	*5%*
3.	*Lab work*	*During semester*	*30%*
4.	*Final Exam*	*16-17*	*50%*
		Total	100%

*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	**1. Skoog, Douglas, Donald West, F. L. Holler, and Stanley Crouch. Fundamentals of analytical chemistry, 9th edition, Cen Learning, USA 2021.** **2. Bard, Allen J. a Larry R. Faulkner. Electrochemical methods: fundamentals and applications. 2nd edition, John Wiley & Sons 2001.**
Supportive References	**1. F. Douglas A. Skoog, Principles of instrumental analysis" 7th Edi 2014.**
Electronic Materials	**https://www.britannica.com/science/chemical-analysis/Electroanalysis**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1. Lecture Hall for 30 students equipped with modern teaching technology (projector, smart board, computer, and internet) 2. Laboratory in accordance with the rules of safety and personal protection accessories should be available to all students
Technology equipment (projector, smart board, software)	- Laptop computer, smart board, and internet access in the classroom and laboratory
Other equipment (depending on the nature of the specialty)	Chemicals and standards used in lab experiments - analytical equipment and accessories, pH meter, analytical balance, conductometer …etc

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of Students' assessment	Instructor & Course coordinator	Class room evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Meeting (3)
DATE	12/03/2024 -02/09/1445