



# Course Specification

## (Bachelor)

Course Title: Corrosion Chemistry

Course Code: CEM449

Program: **Bachelor of Science in chemistry - track of Chemistry**

Department: Chemistry

College: College of Sciences

Institution: Almajmaah University

Version:  New  Updated\*

Last Revision Date: 24/12/2024



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## A. General information about the course:

### 1. Course Identification

1. Credit hours: (3 hours)

#### 2. Course type

A.  University  College  Department  Track  Others  
 B.  Required  Elective

3. Level/year at which this course is offered: (4<sup>th</sup> year – 8<sup>th</sup> level)

#### 4. Course General Description:

This course is designed to provide a basic understanding of corrosion, including its basic definitions, key concepts and types. In addition, the course aims to identify and classify different types of corrosion cells and apply different methods for measuring corrosion rates. It also aims to explain the principles and applications of different methods for preventing corrosion.

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

CEM 343

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

None

#### 7. Course Main Objective(s):

- Study of corrosion of metals and alloys and protection of metals from corrosion.
- Methods of measuring the corrosion rate of metal alloys, different types of corrosion and how to choose corrosion-resistant materials.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid	30	100%
	<ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>	25.5 4.5	85% 15%
4	Distance learning		



### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30h
2.	Laboratory/Studio	30 h
3.	Field	
4.	Tutorial	
5.	Others (specify)	
<b>Total</b>		<b>60h</b>

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	Explain Faraday's laws and corrosion mechanisms according to general principles in the course of electricity and corrosion.	K1	-Lectures. -Conduct scientific research.	-Final exam - Midterm exam - Short tests -Quizzes.
1.2	Recognize the types of cells, polarization cells causing corrosion, their chemical reactions and industrial application of cells.	K2	-Seminars. -Discussions -Brainstorming	- Homework -Class exercises -Evaluation of research
<b>2.0</b>	<b>Skills</b>			
2.1	Interpret the rates and speeds of corrosion processes in metals and chemical compounds.	S1	-Lectures -Laboratories -Active learning - E-learning -Self-learning	- Final exam - Midterm exam - Short tests -Quizzes. - Homework



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Illustrate the phenomenon of corrosion and its various effects are explained.	S3	-Cooperative Education -Examinations	- Class exercises - Evaluation of research -Practical tests
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Collaborates within a team using thinking, ability and persuasion skills in collaboration with others to align information and documents with project accuracy.	V1 V2	-Simulation programs -Cooperative work -Working in groups	-Practical tests - Practical reports - Note card - Research papers.

### C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the relationship between thermodynamics and electrode potentials. Free energy; Faraday's laws.	4
2.	Rate or speed of corrosion.	4
3.	Design of polarized cells; Theory of joint efforts.	4
4.	Kinetic behavior of electrodes; current density; co-polarization.	4
5.	Types of corrosion (pitting, crevice, marine, biological, stress); High temperature corrosion in environmental industries.	4
6.	Corrosion of light metals in aircraft; Galvanic corrosion; Galvanic corrosion principles; Inertness; Inactive layers; Fracture of inert layers.	4
7.	Coating technology for protection against corrosion at high temperatures; corrosion inhibitors; protection with paints.	4
8.	Polarization and scanning technology; microscopic surface analysis.	2
<b>Total</b>		<b>30</b>





## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz 1	4	5%
2.	Mid-term 1	6	15%
3.	Quiz 2	8	5%
4.	Mid-term 2	12	15%
5.	Activities (Homeworks, presentations, oral ...)	1-15	10%
6.	Final Exam	16	50%
	<b>Total</b>		<b>100%</b>

\*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	Corrosion and its control, Prof. Dr. Omar Al-Hazazi, Umm Al-Qura University, 2018. التآكل والسيطرة عليه، أ. د. عمر الهزازي، جامعة أم القرى، 2018
Supportive References	- Principles of corrosion engineering and corrosion control, Zaki Ahmed, Elsevier Science & Technology Books, 2006
Electronic Materials	Corrosion Chemistry (Faraday Discussions) <a href="#">Royal Society of Chemistry</a>
Other Learning Materials	

### 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom accommodated 30 seats and equipped with Internet access.
<b>Technology equipment</b> (projector, smart board, software)	Computer, Projector
<b>Other equipment</b> (depending on the nature of the specialty)	None.



## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leaders, Peer Reviewers.	Course Evaluation Surveys - Opinion Polls via the University Website - Learning Outcomes Evaluation Survey (direct).
Effectiveness of Students assessment	Students, Program Leaders, Peer Reviewers.	Course Evaluation Surveys - Opinion Polls via the University Website - Learning Outcomes Evaluation Survey (direct).
Quality of learning resources	Students, Program Leaders, Faculty members, Peer Reviewers.	Course Evaluation Surveys - Opinion Polls via the University Website - Learning Outcomes Evaluation Survey (direct).
The extent to which CLOs have been achieved	Students, Program Leaders, Peer Reviewers.	Course Evaluation Surveys - Opinion Polls via the University Website - Learning Outcomes Evaluation Survey (direct).
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	Chemistry council
<b>REFERENCE NO.</b>	16
<b>DATE</b>	8/12/2024

