



<b>Form: Course Syllabus</b>	<b>Form Number</b>	EXC-01-02-02A
	<b>Issue Number and Date</b>	2/3/24/2022/2963 05/12/2022
	<b>Number and Date of Revision or Modification</b>	
	<b>Deans Council Approval Decision Number</b>	2/3/24/2023
	<b>The Date of the Deans Council Approval Decision</b>	23/01/2023
	<b>Number of Pages</b>	06

1.	<b>Course Title</b>	Organic Electrochemistry
2.	<b>Course Number</b>	0303737
3.	<b>Credit Hours (Theory, Practical)</b>	(3, 0)
	<b>Contact Hours (Theory, Practical)</b>	(3, 0)
4.	<b>Prerequisites/ Corequisites</b>	-
5.	<b>Program Title</b>	Master's in Chemistry
6.	<b>Program Code</b>	0303
7.	<b>School/ Center</b>	Science
8.	<b>Department</b>	Chemistry
9.	<b>Course Level</b>	Master
10.	<b>Year of Study and Semester (s)</b>	All semesters
11.	<b>Other Department(s) Involved in Teaching the Course</b>	-
12.	<b>Main Learning Language</b>	English
13.	<b>Learning Types</b>	Face to face learning <input type="checkbox"/> Blended <input checked="" type="checkbox"/> Fully online
14.	<b>Online Platforms(s)</b>	<input type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams
15.	<b>Issuing Date</b>	
16.	<b>Revision Date</b>	24-11-2024

**17. Course Coordinator:**

Name: Dr. Mohammad S. Mubarak, Prof.	Contact hours:
Office number:	Phone number: +962791016126
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**18. Other Instructors:**



Name:  
Office number:  
Phone number:  
Email:  
Contact hours:

### 19. Course Description:

Electrochemical principles: Techniques used to investigate electrode reactions; electrochemical reduction of some organic compounds, such as alkyl halides, aryl halides, acyl halides, halogenated heterocyclic compounds, carbonyls, nitro groups, and others; oxidation processes including oxidation of carboxylic acids and aromatic compounds; indirect electrolysis and electrocatalysis with emphasis on the catalytic reduction of the carbon-halogen bond.

**20. Program Student Outcomes (SO's):** (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

**SO1. Demonstrate comprehensive knowledge and understanding of chemistry topics, achieving expertise in foundational research principles.**

**SO2. Develop independent research skills to solve complex problems, focusing on analytical and critical thinking.**

**SO3. Improve communication of scientific knowledge through structured reports, presentations, and discussions.**

**SO4. Engage in activities that enhance practical scientific skills and improve professional expertise.**

**SO5. Maintain ethical standards in research.**

**21. Course Intended Learning Outcomes (CLO's):** (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

**CLO1:** Demonstrate comprehensive knowledge of organic electrochemistry principles, including oxidation-reduction reactions, electrode mechanisms, and electrochemical techniques relevant to organic synthesis.

**CLO2:** Apply fundamental laws of electrochemistry, such as Faraday's laws and the Nernst equation, to analyze thermodynamics, kinetics, and electrode potentials in complex electrochemical reactions.

**CLO3:** Design and interpret experiments using advanced electrochemical techniques, such as voltammetry, coulometry, and bulk electrolysis, to solve research problems and optimize organic transformations.



**CLO4:** Evaluate reaction mechanisms and intermediates in electrochemical reduction and oxidation, including indirect reduction and electrocatalysis, for innovative applications in organic synthesis.

**CLO5:** Communicate scientific findings effectively through structured reports, presentations, and discussions while adhering to ethical and professional standards in research.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1)	•	•				
CLO (2)			•	•		
CLO (3)			•			•
CLO (4)				•	•	
CLO (5)					•	•

**22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:**

Program SO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)
Course CLO's							
CLO (1)	•			•	•		
CLO (2)		•	•				
CLO (3)							•
CLO (4)			•	•		•	
CLO (5)							•

**23. Topic Outline and Schedule:**

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL) Fully Online (FO)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	1.1	Course overview, grading policy, and importance of organic electrochemistry.	1	FO			Quiz1, Final	



	1.2			FO		Quiz1,Final	
	1.3			FO		Quiz1,Final	
2	2.1	Basics of electrochemistry: oxidation-reduction reactions, electrodes, and electrochemical cells.	1	FO		Quiz1,Final	
	2.2			FO		Quiz1,Final	
	2.3			FO		Quiz1,Final	
	3.1	Fundamental laws of electrochemistry (Faraday's laws, Nernst equation).	1	FO		Quiz1,Final	
3	3.2			FO		Quiz1,Final	
	3.3			FO		Quiz1,Final	
	4.1	Electrochemical thermodynamics and kinetics: electrode potentials, overpotentials.	2	FO		Quiz1,Final	
4	4.2			FO		Quiz1,Final	
	4.3			FO		Quiz1,Final	
	5.1	Voltammetry: Linear sweep voltammetry, cyclic voltammetry, and voltammetry in stirred solutions	2,3	FO		Quiz2,Final	
5	5.2			FO		Quiz2,Final	
	5.3			FO		Quiz2,Final	
	6.1	Coulometry and bulk electrolysis: Controlled-potential and controlled-current electrolysis	3	FO		Quiz2,Final	
6	6.2			FO		Quiz2,Final	
	6.3			FO		Quiz2,Final	
	7.1	Electroreduction of carbon-halogen bond; alkyl halides and aryl halides	4	FO		Quiz2,Final	
7	7.2			FO		Quiz2,Final	
	7.3	Electroreduction of acyl halides	4	FO		Quiz2,Final	
	8.1			FO		Quiz2,Final	
8	8.2			FO		Quiz2,Final	
	8.3			FO		Quiz2,Final	
	9.1	Reaction intermediates and trapping of those	4	FO		Quiz2,Final	



		intermediates; mechanisms of electroreduction					
	9.2			FO			Quiz2,Final
	9.3			FO			Quiz2,Final
10	10.1	Electroreduction of nitro compounds and carbonyls	4	FO			Quiz2,Final
	10.2			FO			Quiz2,Final
	10.3			FO			Quiz2,Final
11	11.1	Electroreduction of nitro compounds and carbonyls	4	FO			Final
	11.2			FO			Final
	11.3			FO			Final
12	12.1	Indirect reduction and electrocatalysis	4,5	FO			Final
	12.2			FO			Final
	12.3			FO			Final
13	13.1	Indirect reduction and electrocatalysis	4,5	FO			Final
	13.2			FO			Final
	13.3			FO			Final
14	14.1	Applications of electrocatalysis in organic synthesis	5	FO			Final
	14.2			FO			Final
	14.3	Electrooxidation of carboxylic acids	5	FO			Final
15	15.1	Electrooxidation of amines	5	FO			Final
	15.2			FO			Final
	15.3			FO			Final

#### 24. Evaluation Methods:



Opportunities to demonstrate the achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz1	30	1-5	1,2	After 4 weeks	In class
Quiz2	30	6-10	3,4	After 8 weeks	In class
Final	40	all	All	TBD	In class

## 25. Course Requirements:

(e.g., students should have a computer, internet connection, webcam, account on a specific software/platform...etc.):

## 26. Course Policies:

A- Attendance policies:

B- Absences from exams and submitting assignments on time:

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, and misbehavior:

E- Grading policy:

F- Available university services that support achievement in the course:

## 27. References:

1. Brett, C. M. A., and Brett, A. M. O., Electrochemistry: Principles, Methods, and Applications, Oxford University Press, Oxford, 1993.
2. Rieger P. H., Electrochemistry, 2nd edition, Chapman and Hall, New York, 1994.



3. Sawyer, D. T., Sobkowiak, A., and Roberts, J. L., Jr., Electrochemistry for Chemists, 2nd edition, Wiley-Interscience, New York, 1995.
4. Fry, A. J., Synthetic Organic Electrochemistry, 2nd edition, Wiley, New York, 1989.
5. Shono, T., Electroorganic Synthesis, Academic press, New York, 1991

**28. Additional information:**

Name of the Instructor or the Course Coordinator: <b>Dr. Mohammad S. Mubarak, Prof.</b>	Signature: .....	Date: 24/11/2024
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The Head of Graduate Studies Committee/ Department Chemistry <b>Dr. Murad AlDamen, Prof.</b>	Signature: .....	Date: .....
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The Head of Department of Chemistry <b>Dr. Murad AlDamen, Prof.</b>	Signature: .....	Date: .....
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Vice Dean for Graduate Studies and Scientific Research / School of Science <b>Dr. Kamal Sweidan, Prof.</b>	Signature: .....	Date: .....
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The Dean of School of Science <b>Dr. Mahmoud I. Jaghoub, Prof.</b>	Signature: .....	Date: .....
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