



ASU
جامعة العلوم التطبيقية الخاصة
APPLIED SCIENCE PRIVATE UNIVERSITY

AMMAN - JORDAN



المستوى الذهبي

جامعة كل العرب

Course Syllabus
Faculty of Arts and Science
Academic Department Chemistry
Academic Year 2022/2023 Semester: First

Course Title :	Electroanalytical Chemistry
Course No. :	1722412
Prerequisite :	1722312
Concurrent :
Department :	Chemistry
Coordinator :	Dr. Waed Alahmad
Mode of Instruction	<u>Blended Learning</u> - 2 hours in-class (Synonym) learning - 1 hour online asynchronous learning using Edu-Gate

* **Instructor:**

Lecturer	Office Phone	Room No.	Office Hours	E-mail
<i>Dr. Waed Alahmad</i>	1414	221		W_alahmad@asu.edu.jo

Course Description

This course covers galvanic cells; standard electrode potential; oxidation-reduction titrations; applications of redox titrations; potentiometric methods; electrogravimetry; coulometry; voltammetry; polarography Oxidation-reduction reactions; galvanic cells; standard electrode potential; oxidation-reduction titrations; applications of redox titrations; potentiometric methods; electrogravimetry; coulometry; voltammetry; polarography.

Amman – Jordan _ عمان – الأردن: Amman – Jordan _ فاكس: 5232899 _ Tel: 5609999

رمز النموذج: UF 28 /2

رقم القرار 24 / 233

تاريخ الاعتماد 2021/10/18



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Intended Learning Outcomes

Upon the completion of the course, this module should lead to the following learning outcomes:

A. Knowledge and Understanding (Student should):

- A1 Recognize properties of electrolytic and non-electrolytic solutions, types of electrochemical cells, different types of electrodes.
- A2 Understand the differences and application of between wet and instrumental electroanalytical techniques and methods

B. Cognitive and Intellectual Skills (Student should):

- B1 Analyze and compare the different applications requirements
- B2 Solve practical and theoretical electrochemical .
- B3 Explain principles of designing different electrochemical cells (Galvanic, electrolytic and concentration)

C. Subject Specific Skills (Student should):

- C1 Online Researching on different topics in different websites of the studied topics.
- C2 Promote problem-solving skills

Program Learning Outcomes (PLOs):

1.1	Describe the fundamentals of chemistry including structure, reactivity and properties of chemical substances, different situation of reaction and the states of matter.
1.2	Construct essential facts, principles and theories across the four principal areas of chemistry, i.e. analytical, organic, inorganic and physical.
2.1	Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties
2.2	Explain concepts, principles and determine the efficiency of chemical systems by applying mathematical expressions
2.3	Analyze chemical and spectral data to identify and confirm chemical structures as well as determine chemical composition
3.1	Demonstrate adequate life-long learning skills
3.3	Select appropriate techniques and procedures for chemical synthesis and analysis.
4.1	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library databases
4.2	Communicate effectively both orally and in writing with professionals and/or lay audience



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Course Learning Outcomes Alignment Matrix							
PLO	A1	A2	B1	B2	B3	C1	C2
1.1	√						
1.2		√					
2.1			√				
2.2				√			
2.3					√		
3.1						√	
3.3							√
4.1						√	
4.2							√

Course Contents and Schedule

Week	Day and Date	Topics to be covered	Method of instruction	CLOs	PLOs
1	Sun. Tue. Thur.	Oxidation-reduction reactions, electrochemical cells, electrode potentials, the potential of electrochemical cells, the laws of electrolysis.	In-class lecture	A1	1.1 1.2
			In-class lecture		
2	Sun. Tue. Thur.	Oxidation-reduction reactions, electrochemical cells, electrode potentials, the potential of electrochemical cells, the laws of electrolysis.	In-class lecture	B1	2.5
			In-class lecture		
3	Sun. Tue. Thur.	Oxidation-reduction reactions, electrochemical cells, electrode potentials, the potential of electrochemical cells, the laws of electrolysis.	In-class lecture	A2	2.3
			In-class lecture		
4	Sun. Tue. Thur.	Equilibrium constants for oxidation-reduction reactions, redox titration curves, oxidation-reduction titrations, potentiometric endpoint detection.	In-class lecture	A2	2.3
			In-class lecture Quiz 1		



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5	Sun. Tue. Thur.	Equilibrium constants for oxidation-reduction reactions, redox titration curves, oxidation-reduction titrations, potentiometric endpoint detection.	In-class lecture In-class lecture	B2 B3	3.3
6	Sun. Tue. Thur.	Auxiliary oxidizing and reducing reagents, applications of standard reductants, applications of standard oxidants, some specialized oxidants.	In-class lecture In-class lecture	A1	1.1 1.2
7	Sun. Tue. Thur.	Auxiliary oxidizing and reducing reagents, applications of standard reductants, applications of standard oxidants, some specialized oxidants.	In-class lecture In-class lecture	A1	1.1 1.2
8.	MID Term Exam				
9	Sun. Tue. Thur.	General principles, reference electrodes, liquid-junction potentials, indicator electrodes, types of metallic indicator electrodes, membrane electrodes, crystalline-membrane electrodes, gas sensing probes, instruments for measuring cell potentials, direct measurement and potentiometric titrations,	In-class lecture Online sessions (asynchronous)	B1	2.5
10	Sun. Tue. Thur.	the detection of equilibrium constants for acid-base neutralization, internal standard method, and potentiometric titrations	In-class lecture Online sessions (asynchronous)	B2	4.3
11	Sun. Tue. Thur.	Bulk Electrolysis techniques The effect of current on cell potential, types of polarization, modes of mass transfer, electrogravimetric methods of analysis, electrogravimetric calculations, types of coulometric methods, current efficiency , controlled-current and controlled potential coulometry, coulometric titrations, instrumentation, potentiostats, coulometer and cells.	In-class lecture Online sessions (asynchronous)	B2	3.3
12	Sun. Tue. Thur.	Polarography General principles, excitation signal, voltammetric system, microelectrodes, voltammograms,	Online sessions (asynchronous) In-class lecture Quiz 2 Online sessions	C2	4.3



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		hydrodynamic voltammetry, voltammetric sensors, amperometric titrations, polarography, DME, tast polarography, pulse techniques, stripping analysis	(asynchronous)		
13	Sun. Tue. Thur.	Polarography General principles, excitation signal, voltammetric system microelectrodes, voltammograms, hydrodynamic voltammetry, voltammetric sensors, amperometric titrations, polarography, DME, tast polarography, pulse techniques, stripping analysis	Online sessions (asynchronous) In-class lecture	C2	4.4
			Online sessions (asynchronous)		
14	Sun. Tue. Thur.	Voltammetry techniques Voltammetry techniques, Cyclic voltammetry, Basic principles and applications , Hydrodynamic voltammetry techniques , Stripping analysis techniques	Online sessions (asynchronous) In-class lecture	C1	1.3
			Online sessions (asynchronous) In-class lecture		
15	Sun. Tue. Thur.	Voltammetry techniques Voltammetry techniques, Cyclic voltammetry, Basic principles and applications , Hydrodynamic voltammetry techniques , Stripping analysis techniques	Online sessions (asynchronous) In-class lecture	C1	3.1
			Online sessions (asynchronous) In-class lecture		
16.	Final Exam				

Grading Plan and Assessment Tools

Assessment Tools	Weights	Due date
Mid-term	30	TBA
Assignments	10	TBA
Quizzes	10	TBA
Inter active lectures	
Group Work	
Presentation	
Reports	
Project	
Case-Study	
Final Exam	50	TBA



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Supplementary Reading

Textbook:

- Fundamentals of Analytical Chemistry, Jan 1, 2013 9th Edition by Douglas A. Skoog and Donald M. West, F. James Holler (Author), Stanley R. Crouch (Author), ISBN-10: 0495558281 | ISBN-13: 9780495558286

References:

- Analytical Chemistry: An Introduction, 8th ed. by D.A. Skoog, D. M. West, F. J. Holler and S.R. Crouch (2007). ISBN 0-03-020293-0.
- Analytical Chemistry, 7th Edition by Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug, 2013- 2014, ISBN : 978-1-118-80516-9



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Subject Coordinator Dr. Waed Alahmad Signature: -----

Head of Curriculum Committee Dr. Hussam Miqdad Signature: -----

Department Head Dr. Hussam Miqdad Signature: -----

Faculty Dean Dr. Hadeel Ali Saed Signature: -----

Copy to:

- Department Head.
- Head of Curriculum Committee.
- Course File.

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