

COURSE SPECIFICATIONS

Form

Course Title: **Advanced Electrochemistry**

Course Code: **4026838-3**



Date: 27-10-2018

Institution: Umm Al-Qura University.

College: Faculty of Applied Science

Department: Department of Chemistry

A. Course Identification and General Information

1. Course title and code: **Advanced Electrochemistry / 4026838-3**

2. Credit hours: **3 (theoretical)**

3. Program(s) in which the course is offered. **M. Sc. in Chemistry**

(If general elective available in many programs indicate this rather than list programs)

4. Name of faculty member responsible for the course. **Prof. Metwally Abdallah**

5. Level/year at which this course is offered: **3rd / 2nd**

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

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

8. Location if not on main campus: **El-Abedyah, El-Azizya, and El-Zaher**

9. Mode of Instruction (mark all that apply):

a. Traditional classroom

percentage?

b. Blended (traditional and online)

percentage?

90

c. E-learning

percentage?

d. Correspondence

percentage?

f. Other

percentage?

10

Comments:

B Objectives

1. The main objective of this course

By the end of this course students will be able to:

- Discuss the irreversible electrode processes.
- Explain how the current efficiency can be determined.
- Stratify the principles of electrical double layer and how the metal interacts with electrolytes.
- Discuss the different types of over potentials and how its measured.
- Understand thermodynamic of corrosion process, and how the corrosion process is controlled.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

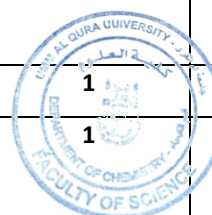
- Updating the course content with the techniques that will be recently introduced in the field.
- The use of smart teaching halls for lectures.
- Increased use of IT or web based reference material.
- Encourage students to carry out research reports in the subjects using the library, data base services, and/or websites.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
• Irreversible electrode processes.	1	3
• The current efficiency.	1	3
• Electrical double layer: structure of double layer, different types of double layer.	1	3
• Measurements of double layer capacity, electro capillary curves.	1	3
• Electro kinetics phenomena. Kinetics of electrode reaction.	1	3
• Activity coefficient, mass transport, ionic migration.	1	3
• Diffusion, theory of diffusion current.	1	3
• Electrolysis and overpotential.	1	3
• Different types of over potential, ohmicover potential, activation over potential, concentration over potential, IR drop.	1	6
• Modified electrode.	1	3
• Thermodynamic of corrosion process: change in Gibbs free energy, liquid junction potential, Pourbaix diagram.	1	3



• Corrosion control.				1		3	
2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	39	-	-	-	-	39
	Actual	39	-	-	-	-	39
Credit	Planned	3	-	-	-	-	3
	Actual	3	-	-	-	-	3

3. Individual study/learning hours expected for students per week.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Describe the role of electrochemistry in living systems.	<ul style="list-style-type: none"> • Use of the internet to carry out some reports on course subjects. • Lectures • Discussion groups • Seminar • In class problems 	<ul style="list-style-type: none"> • Written assignments • Presentations • Formal mid-term and final exams.
1.2	Explain the experimental methods and tools used in electrochemistry.		
1.3	Mention the role of electrochemistry in industry.		
1.4	Determine the type of interaction between the metal ions and electrolytic solutions		
1.5	Write on the electrochemistry of aqueous solutions.		
2.0	Cognitive Skills		
2.1	Estimate the corrosion of the metals and alloys.	<ul style="list-style-type: none"> • Web-based study. • Lectures. 	<ul style="list-style-type: none"> • Measuring the response to the assignments.
2.2	Report the corrosion inhibitors.		
	Design scientific methods and think to solve		

	problems concerning the course.	• Scientific discussion	• Periodic tests and assignments.
	Estimate the distinctive features of the organic and inorganic compounds as corrosion inhibitors	• Library visits.	
	Apply the experimental methods and tools in electrochemistry.		
3.0	Interpersonal Skills & Responsibility		
3.1	Manage resources, time and collaborate with members of the group	• Teamwork groups for cooperative work making.	• Oral presentations • Group discussion • Reports
3.2	Use university library and web search engines for collecting information and search about different topics	• Solving problems in groups during lecture. • Open discussion about recent topic of the course	
4.0	Communication, Information Technology, Numerical		
4.1	Work effectively both in a team, and independently on solving chemistry problems.	• Use digital libraries for literature survey	• Web-based student performance systems.
4.2	Communicate effectively with his lecturer and colleagues	• Use E-Learning Systems for the communication with lecturer through the course work	• Individual and group presentations.
4.3	Use information and communication technologies		• Evaluating the activities of the students through the semester .
5.0	Psychomotor(if any)		
5.1	Not applicable		

5. Assessment Task Schedule for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Assignments and activities.	--	10 %
2	Midterm Exam.	8	30 %
3	Final Exam.	15-16	60 %
4	Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- Availability of Staff members to provide counselling and advice.
- Office hours: During the working hours weekly.
- Academic advising for students.

E Learning Resources

<p>1. List Required Textbooks</p> <ul style="list-style-type: none"> • Electrochemistry, The Basics, With Examples, Christine Lefrou, Pierre Fabry, Jean-Claude Poignet, 2012, Speinger. • Giridhar Sharma, Advanced Electrochemistry Hardcover, Amazon, 2017.
<p>2. List Essential References Materials (Journals, Reports, etc.)</p> <p>* Lecture hand outs available on the coordinator website.</p>
<p>3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.</p> <ul style="list-style-type: none"> • http://en.wikipedia.org/wiki/ • http://www.chemweb.com/ • Websites on the internet relevant to the topics of the course
<p>4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.</p> <p>* Non</p>

F. Facilities Required

<p>Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)</p>
<p>1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p> <p>- Appropriate teaching class including white board and data show with at least 25 seats.</p>
<p>2. Technology resources (AV, data show, Smart Board, software, etc.)</p> <p>- Computer halls access for the students will be helpful in doing their tasks during the course.</p>
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)</p> <p>- No other requirements.</p>

G Course Evaluation and Improvement Procedures

<p>1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none"> • Student discussion with the instructor allow for continuous feedback through the course progress. • Student Evaluation Questionnaires.
<p>2. Other Strategies for Evaluation of Teaching by the Instructor or the Department</p> <ul style="list-style-type: none"> • Discussions within the group of faculty teaching the course. • Peer consultation on teaching strategies and its effectiveness.
<p>3. Procedures for Teaching Development</p> <ul style="list-style-type: none"> • Workshops given by experts on new teaching and learning methodologies will be attended. • Improving of the teaching strategies by monitoring the evaluation of the students progress through the semester
<p>4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)</p> <ul style="list-style-type: none"> • Peer reviewing of random samples including periodic and final exams of the students will be done.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning</p>

for developing it.

- The course will be evaluated periodically after each semester based on the results of the students and the report presented by the teaching staff that will be discussed with the course coordinator to improve the course.

Name of Course Instructor: Prof. Metwally Abdallah

Signature:  Date Completed: 27 – 10 - 2018

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature:  Date Received: 28/10/2018

