

ATTACHMENT 5.

Kingdom of Saudi Arabia
The National Commission for Academic Accreditation &
Assessment

T6. Course Specifications
(CS)

Advanced Electrochemistry

(402645-3)



Course Specifications

Institution: Umm Al-qura University	Date: 2017
College/Department: Faculty of Applied Sciences / Department of Chemistry	

A. Course Identification and General Information

1. Course title and code: Advanced Electrochemistry / 402645-3			
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): not applicable			
7. Co-requisites for this course (if any): not applicable			
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	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="100"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
d. correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
Comments:			

B Objectives

1. What is the main purpose for 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 interact 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. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

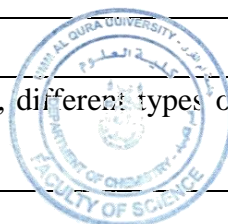
- Increased use of IT or web based reference material.
- The use of smart teaching halls for lectures.
- Encourage students to carry out research reports in the field of electrochemistry using the library, data base services, and/or websites.
- Changes in content as a result of new research in the field.

C. Course Description (Note: General description in the form used in 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 hours and credits per semester):

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	39	-		-		39
Credit	3	-		-		3

3. Additional private study/learning hours expected for students per week.

2

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

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 intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from

each domain.)			
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"> • Lectures • Scientific discussion • Use the library to work duties and a small research on advanced electrochemistry topics. • Use of the internet to carry out some reports on course subjects. 	<ul style="list-style-type: none"> • Written mid-term and final exams. • Long and short essays.
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"> • Lectures • Scientific discussion • Library visits • Web-based study 	<ul style="list-style-type: none"> • Periodic tests and assignments • Measuring the response to the assignments.
2.2	Report the corrosion inhibitors.		
2.3	Design scientific methods and think to solve problems concerning the course.		
2.4	Estimate the distinctive features of the organic and inorganic compounds as corrosion inhibitors		
	Apply the experimental methods and tools in electrochemistry.		
3.0	Interpersonal Skills & Responsibility		

3.1	Operate in team work and accept his college's opinions.	<ul style="list-style-type: none"> • Dividing students into groups to carry out collective scientific reports. • Periodic individual duties to develop the skill of taking responsibility and self-reliance. 	<ul style="list-style-type: none"> • Evaluate the results of collective works and duties as well as knowing the contribution of each individual through dialogue and discussion. • Assessment of individual tasks and duties to determine the student's ability to self-reliance.
3.2	Choose the suitable method to solve problems.		
3.3	Develop the student's ability in self-reliance and responsibility.		
4.0	Communication, Information Technology, Numerical		
4.1	Use computers and the international information network (the Internet) to perform calculations and to identify recent research relevant to decision sources.	<ul style="list-style-type: none"> • Visiting research centers. • The use of computers in the training room of the department. • Using the internet for collecting data. 	<ul style="list-style-type: none"> • Evaluation of the duties associated with the proper use of numerical and communication skills. • Web-based student performance systems. • Individual and
4.2	Communicate effectively in oral and written forms.		
4.3	Use basic mathematical and statistical techniques to perform data analysis.		

			group presentations.
5.0	Psychomotor		
5.1	Not applicable.		
5.2			

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, 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

<p>1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)</p> <ul style="list-style-type: none"> • Office hours: During the working hours weekly. • Academic advising for students. • Availability of Staff members to provide counseling and advice.

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. • J. Koryta, J. Dvorak, L. Kavan, Principle of Electrochemistry, 1993, John Wiley&Sons. • V. S. Bagotsky Fundamentals of Electrochemistry, Second Edition, 2005, <p>http://onlinelibrarystatic.wiley.com/images/wolSiteLogo.png</p>
<p>2. List Essential References Materials (Journals, Reports, etc.)</p>

<ul style="list-style-type: none"> Journal of Electroanalytical Chemistry.
<p>3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)</p> <ul style="list-style-type: none"> J of Electrochem Soc. Electrochimica Acta
<p>4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.</p> <ul style="list-style-type: none"> http://www.sciencedirect.com/ http://www.springer.com/ http://www.jes.ecsdl.org/
<p>5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. 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> <ul style="list-style-type: none"> Equipped lecture hall and laboratory equipped specializing in inorganic chemistry.
<p>2. Computing resources (AV, data show, Smart Board, software, etc.)</p> <ul style="list-style-type: none"> Room equipped with computers, data show and TV.
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) : No other requirements.</p>

G Course Evaluation and Improvement Processes

<p>1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none"> Structured group discussions and/or focus groups. Questionnaires can be used to collect student feedback. Student representation on staff-student committees and institutional bodies.
<p>2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department</p> <ul style="list-style-type: none"> The instructor's statement of his/her goals for the course, teaching methods and philosophy, student outcomes, and plans for improvement are a critical source of information. A systematic self-review has the potential for contributing significantly to the instructor's teaching improvement by focusing on the strengths and weaknesses of the course in light of

his/her original course objectives. <ul style="list-style-type: none">• Visits by other faculty can provide information about the process of teaching.
3. Processes for Improvement of Teaching <ul style="list-style-type: none">• Providing new tools for learning.• The application of e-learning.• Exchange of experiences internal and external.• Training programs and workshops for Staff member.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) <ul style="list-style-type: none">• Check marking by an independent member teaching staff of a sample of student work.• Periodic exchange and remarking of tests or a sample of assignments with staff at another institution.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. <ul style="list-style-type: none">• Workshops for teachers of the course.• Periodic review of the contents of the syllabus and modify the negatives.• Consult other staff of the course.• Hosting a visiting staff to evaluate of the course.

Name of Instructor: **Prof. Metwally Abdallah**

Signature: _____ Date Report Completed: **2017**

Name of Field Experience Teaching Staff _____

Program Coordinator: _____

Signature: _____

Date Received: _____

