

معلومات المقرر * (Course Information):

اسم المقرر:	كيمياء كهربية متقدمة
رقم المقرر:	CHM 438
اسم ورقم المتطلب السابق:	كيمياء كهربية
اسم ورقم المتطلب المرافق:	لا يوجد
مستوى المقرر:	المستوى الثامن
الساعات المعتمدة:	3
Module Title:	Advanced electrochemistry
Module ID:	CHM 438
Prerequisite (Co-requisite):	Electrochemistry , CHM 334
Co-requisite:	None
Course Level:	8th level
Credit Hours:	3 (2+2)

Module Description

وصف المقرر:

This course is divided into two sections: The first section will cover the following topics :

The electrolyte double layer and electro kinetic effects, theoretical studies of the double layer, electrical potential and current, The migration of ions ,Free energy , electrolysis, fuel cells, polarization , Butler-Volmer equation -Tafel equation – study the mechanism of the electrode processes .

The second section will cover the following topics :

The deposition and corrosion of metals, Theories of corrosion -Electrochemical mechanism of corrosion - factors affecting corrosion – passivity – Flade potential - Pourbaix diagrams -Inhibitors, protection of metals. Electro kinetic phenomena.

Methods of applying metallic coating, Classification of Metallic coating .

Electroplating with more noble metal metals ,Electroplating with less noble metal metals

Electroplating of some industrial important alloys

The linear and Cyclic Voltammetry, Data Interpretation, Reversible Systems, Irreversible and Quasi-reversible Systems, Study of Reaction Mechanisms.

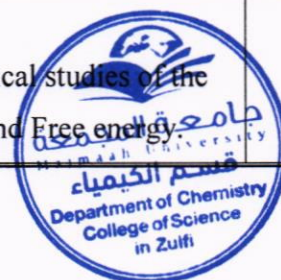
Impedance Spectroscopy Principles and Applications.

laboratory : included some experiments to cover theoretical lecture.

Module Aims

أهداف المقرر:

1	For students undertaking this course, the aims are to: Study the electrolyte double layer and electro kinetic effects, theoretical studies of the double layer, electrical potential and current, The migration of ions and Free energy.
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2	Study the electrolysis, fuel cells, polarization and over potential , Butler-Volmer equation and Tafel equation .	
3	Knowledge the mechanism of the electrode processes .	
4	Study The deposition and corrosion of metals, Theories of corrosion -Electrochemical mechanism of corrosion -factors affecting corrosion – passivity – Flade potential - Pourbaix diagrams -Inhibitors, protection of metals. Electro kinetic phenomena.	
5	Study the methods of applying metallic coating, Classification of Metallic coating	
6	Study the electroplating with more noble metal metals ,Electroplating with less noble metal metals ,Electroplating of some industrial important alloys	
7	Knowledge the linear & cyclic Voltammetry, Data Interpretation, Reversible Systems, Irreversible and Quasi-reversible Systems, and Reaction Mechanisms.	
8	Knowledge the Impedance Spectroscopy Principles and Applications.	
9	Do the experiments to cover theotrical lecture	

Learning Outcomes:

مخرجات التعليم:

	On completing this course, students will be able to:	
1	Knowledge about the electrolysis, fuel cells, polarization and over potential , Butler-Volmer equation , Tafel equation, electrolyte double layer	
2	Explain the Impedance Spectroscopy, Principles and Applications and Differentiate between the deposition metallic coating ,and corrosion of metals	
3	Solve the unexpected problems by creative ways	
4	Apply the skills acquired in the academic and professional contexts related to the science of chemistry.	
5	Learn how to search for information through library and internet and work in team to Participate Effective in the activities of the methodology	
6	Communicate with teacher through solve problems and questions and work in groups by using information technology and modern computer tools and Communicate verbally and in writing during the lecture	
7	Use laboratory tools and security and safety tools properly	

Course Contents:

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)



مجلس التعليم العالي
البحرين
القطيف



4	2	The electrolyte double layer and electro kinetic effects, theoretical studies of the double layer, electrical potential and current, The migration of ions and Free energy.
4	2	The electrolysis, fuel cells, polarization and over potential , Butler-Volmer equation and Tafel equation .
2	1	The mechanism of the electrode processes
4	2	Mid-Term Exam I .The deposition and corrosion of metals, Theories of corrosion -Electrochemical mechanism of corrosion -factors affecting corrosion – passivity – Flade potential - Pourbaix diagrams - Inhibitors, protection of metals. Electrokinetic phenomena.
4	2	Methods of applying metallic coating, Classification of Metallic coating . Electroplating with more noble metal metals ,Electroplating with less noble metal metals .
2	1	Methods of applying metallic coating, Classification of Metallic coating
4	2	Mid-Term Exam II, Electroplating with more noble metal metals ,Electroplating with less noble metal metals ,and Electroplating of some industrial important alloys .
4	2	The linear & cyclic Voltammetry , Data Interpretation, Reversible Systems, Irreversible and Quasi-reversible Systems, Study of Reaction Mechanisms
2	1	Impedance Spectroscopy Principles and Applications.
(Practical) 26	13	laboratory : included some experiments to cover theatrical lecture.

Note: 1contact hour = 50 min

Textbook and References:

الكتاب المقرر والمراجع المساندة:

ISBN	سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
SSN: 2330-1546 (Print): ISSN: 2330-1554 (Online)	2014, Volume 2 Vol. 2, No. 1 (June 2014) 2013, Volume 1 Vol. 1, No. 2 (August 2013) Vol. 1, No. 1 (April 2013)	American Scientific Publishers.	Dr. Marshal Dhayal, India	Advanced Electrochemistry
ISBN-13: 978-0198769866 ISBN-10: 0198769865	2018	Oxford University Press	Peter Atkins and etc.	Physical Chemistry 11 th ed.
978-3-52731069-2	2007	John Wiley	Carl H. Hamann ,	Electrochemistry

صفحة 3 من 3

	سنة النشر Publishing Year	& Sons اسم الناشر Publisher	Andrew Hamnett اسم المؤلف (رئيسي) Author's Name	اسم المرجع Reference
	2014	Département de chimie Université de Sherbrooke	Andrzej Lasia	Advanced Electrochemistry Interfaces, thermodynamics, and electrochemical techniques
ISBN-10: 1441904549, ISBN-13: 978-1441904546. Edition)	; 1st Edition. edition (2010);	Springer	Edward McCafferty	Introduction to Corrosion Science
ISBN-10: 0470943076, ISBN-13: 978-0470943076 3	1st edition (2011)	Wiley-Scrivener	Volkan Cicek and Bayan Al-Numan	Corrosion Chemistry
	January 31, 2008	Read Books	Friedrich Rudolf Schenck,	The Physical Chemistry Of The Metals,
Wang ,Joseph ,	Analytical Electrochemistry ,3th edition		Wang ,Joseph ,	Analytical Electrochemistry ,3th edition

International Journal of Minerals, Metallurgy, and Materials:

<http://www.springer.com/materials/journal/12613>

websites:

<http://pogil.org>

and <http://www.pcrest.com/PC/pub/index.htm>

* يتم تعبئة معلومات المقرر فقط باللغتين العربية والانجليزية وباقي المعلومات بلغة التدريس المعتمدة ويكرر لكل مقرر في الخطة الدراسية

* Course Information should be filled in Arabic and English. Other information should be filled using the approved teaching language at the college.



