

COURSE SPECIFICATIONS Form

Course Title: **Electroanalytical Chemistry**

Course Code: **4026844-3**



Date: 29-10-2018

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: **Electroanalytical Chemistry / 4026844-3**

2. Credit hours: **3 hrs. (Theoretical)**

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

4. Name of faculty member responsible for the course: **Dr. Mohammed Ahmed Kassem**

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"/> | percentage? | <input type="checkbox"/> |
| b. Blended (traditional and online) | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="80%"/> |
| c. E-learning | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="20%"/> |
| d. Correspondence | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| f. Other | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |

Comments:

B Objectives

1. The main objective of this course

By the end of this course, students able to understand the fundamental principles of electrochemistry and electrochemical methods of analysis. Also, The student will learn about the theoretical aspects of electrochemical measurements whether they are used for determining some physical properties of a system or for detecting an analyte.

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)

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

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
• The fundamental principles of electrochemistry and electrochemical methods of analysis.	2	6
• The theoretical aspects of electrochemical measurements whether they are used for determining some physical properties of a system or for detecting an analyte.	2	6
• Structure of electrode interface and the diffusion.	1	3
• Linear and cyclic voltammetry.	2	6
• Polarography and potentiometry (ion selective electrode).	1	3
• Potential step methods and Differential- and square-wave.	1	3
• Stripping voltammetry, coulometry, conductometric and amperometric analysis.	2	6

• Hydrodynamic voltammetry, rotating electrode technique	1	3
• Electrochemical impedance spectroscopy.	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	3	---	---	---	---	3
Credit	Planned	39	---	---	---	---	39
	Actual	3	---	---	---	---	3

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

2 Hrs.

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	• Understand the fundamental principles of electrochemistry and electrochemical methods of analysis.	• Lectures • Scientific discussion • Use the library to	• Written mid-term and final exams.
1.2	• Describe the structure of electrode interface.	work duties and a small research on	• Long and short essays.
1.3	• Write about polarography and potentiometry.	electroanalytical	

1.4	<ul style="list-style-type: none"> Identify theoretical aspects of electrochemical measurements whether they are used for determining some physical property a system or for detecting an analyte. 	Chemistry. <ul style="list-style-type: none"> Use of the internet to carry out some reports on course subjects. 	
1.5	<ul style="list-style-type: none"> Explain scientific basis of the hydrodynamic voltammetry. 		
1.6	<ul style="list-style-type: none"> Outline the rotating electrode technique and electrochemical impedance spectroscopy. 		
1.7	<ul style="list-style-type: none"> Recording the relation between differential- and square-wave voltammetry. 		
1.8	<ul style="list-style-type: none"> Compare between Linear and cyclic voltammetry. 		
2.0	Cognitive Skills		
2.1	<ul style="list-style-type: none"> Interpret the theoretical aspects of electrochemical measurements whether they are used for determining some physical property a system or for detecting an analyte. 	<ul style="list-style-type: none"> Lectures Scientific discussion Library visits Web-based study Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course. Enhancing open discussion during the lecture. 	<ul style="list-style-type: none"> Mid-term and final exams. Measuring the response to the assignments. Through assignments and homework
2.2	<ul style="list-style-type: none"> Discover the potential step methods. 		
2.3	<ul style="list-style-type: none"> Apply a rotating electrode technique. 		
2.4	<ul style="list-style-type: none"> Modify the electrochemical impedance spectroscopy. 		
2.5	<ul style="list-style-type: none"> Formulate the relation linear and cyclic voltammetry. 		
3.0	Interpersonal Skills & Responsibility		
3.1	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Evaluate the results of collective works and duties as well
3.2	<ul style="list-style-type: none"> Choose the suitable method to solve problems. 		

3.3	<ul style="list-style-type: none"> Develop the student's ability in self-reliance and responsibility. 	<ul style="list-style-type: none"> Periodic individual duties to develop the skill of taking responsibility and self-reliance. 	<p>as knowing the contribution of each individual through dialogue and discussion.</p> <ul style="list-style-type: none"> Assessment of individual tasks and duties to determine the student's ability to self-reliance.
4.0	Communication, Information Technology, Numerical		
4.1	<ul style="list-style-type: none"> 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 group presentations.
4.2	<ul style="list-style-type: none"> Communicate effectively in oral and written forms. 		
4.3	<ul style="list-style-type: none"> Use basic mathematical and statistical techniques to perform data analysis. 		
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)

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

E Learning Resources

1. List Required Textbooks

- A.J. Bard and L. R. Faulkner, *Electrochemical Methods: Fundamentals and Applications*, John Wiley and Sons., 2nd ed. 2001
- *Fundamentals of Electroanalytical Chemistry*, Paul M. S. Monk, Manchester Metropolitan University, Manchester, UK, 2001.

2. List Essential References Materials (Journals, Reports, etc.)

- [Journal of Electroanalytical Chemistry](#).
- [Journal of Analytical Chemistry](#).

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- <http://nsdl.niscair.res.in/jspui/>
- <http://www.chemistry.uoc.gr/>
- <http://www.chemie.uni-hamburg.de/>

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- None.

F. Facilities Required

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.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Equipped lecture hall equipped specializing in electroanalytical chemistry.

2. **Technology** resources (AV, data show, Smart Board, software, etc.)

- Room equipped with computers, data show and TV.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- No other requirements.

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

- Structured group discussions and/or focus groups.

<ul style="list-style-type: none">- 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 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.- Visits by other faculty can provide information about the process of teaching.- Colleagues have the expertise to evaluate the quality of a course as evidenced by its content and format (peer reviewers).
<p>3. Procedures for Teaching Development</p> <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.- Review of strategies proposed.
<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">- 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.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.</p> <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 Course Instructor: Dr. Mohammed Ahmed Kassem

Signature:  **Date Completed: 29 – 10 - 2018**

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature:  **Date Received: 30/10/2018**

