



<b>University of Petra</b>	 جامعة البترا University of Petra	 جامعة البترا - خمسة وعشرون عاما University of Petra Anniversary
<b>Faculty of arts and sciences</b>		
<b>Department of Chemistry</b>		
		<b>كلية الآداب والعلوم</b>
		<b>قسم الكيمياء</b>

## Course Syllabus

**Year:** 2019/2020

**Semester:** First

Course No.	Course Title	Prerequisite	Co-requisite	Credit Hours Lectures / ECTS value
101241	Analytical chemistry	101102	101247	3/ 5 ECTS: European Credit Transfer System

Instructor Name	e-mail	Office No.	Office ext.	Office Hours
DR. ABDEL MNIM ALTWEIQ	aaltweiq@uop.edu.jo	7115	6500	Sun., Tues., Thurs.: 10 <sup>00</sup> -11 <sup>00</sup> and 13 <sup>00</sup> – 14 <sup>00</sup> (Sun.) Mon., Wed.: 11 - 12

<b>Course Description</b>	Analytical chemistry is the science of obtaining, processing and communicating information about the composition and the structure of matter. In other words, it is the art and science of determining what matter is and how much of it exists by using classical wet method like titration and gravimetric analysis.
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### Course Objectives

- To develop in students the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems in chemistry.
- To provide students with a knowledge and skills base from which they can proceed to further studies in specialized areas of analytical chemistry or multi-disciplinary areas involving analytical chemistry.
- To instill in students a sense of enthusiasm for analytical chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.

## **Course Intended Learning Outcomes (ILOs) and their Alignment with Program ILOs:**

Upon successful completion of this course, students are expected to achieve the following learning outcomes:

<b>Course ILOs</b>	<b>Program ILOs</b>	<b>Teaching and Learning Method</b>	<b>Assessment Method</b>
<b>Knowledge (K)</b>			
1. Demonstrate knowledge and understanding of data handling, concentration expressions, titration, volumetric analysis, gravimetric analysis, acid and bases definitions, solubility, complexometric titration, redox titration and precipitation titration	<b>K1</b>	Lectures and discussion	First, second and final exams
2. Describe the different steps and details involved during the different types of titration and gravimetric analysis.	<b>K3</b>		
3. Describe the principles of quantitative and qualitative chemical analysis involving the volumetric and gravimetric methods.	<b>K3</b>		
<b>Intellectual Skills (I)</b>			
1. Perform calculations related to the error in chemical data, accuracy, precision, Q and t-test, validation of chemical result, different expressions of chemical concentration, and different types of volumetric and gravimetric titration, the Henderson-Hassel-Balch equation and buffer solutions.	<b>I2</b>	Lectures and discussion	First, second and final exams
<b>Transferable Skills (T)</b>			
1. Demonstrate critical-thinking and problem-solving skills	<b>T2</b>		

## **Course Schedule:**

<b>Week</b>	<b>Topics</b>	<b>Topic Details</b>	<b>Reference</b>
1	An introduction to analytical chemistry	Qualitative & Quantitative analysis, Operation and tools that used in chemical analysis	The textbook
2	Errors in chemical analysis	Types of errors, accuracy and precision.	The textbook
3	Statistical Data treatment	Q-test, validation of chemical result, t-test,	Reference 2

4	Chemical Equilibria	Acids and bases, strength of acids and bases, chemical equilibrium, equilibrium-constant expressions	The textbook
5	Buffer solutions	Types, The Henderson-Hassel-Balch equation, calculations	The textbook
6	Titrations in analytical chemistry	Some terms used in volumetric titration, primary standard, Types of titration.	The textbook
7	Volumetric calculations	Volumetric calculations of different types of titration	The textbook
8	Acid – Base Titrations	Standard solutions and indicators, titration of strong acids and bases	The textbook
9	Acid – Base Titrations	titration of weak acids and bases, titration of polyprotic acids	The textbook
10	Redox titration	Oxidation and reduction, application, examples	Reference 1
11	Complexation and precipitation Titrations	The formation of complexes, complexation equilibria, EDTA titration	The textbook
12	Gravimetric Methods of Analysis	Steps of gravimetric method, properties of precipitates, calculation of results from gravimetric data	The textbook

### **Assessment Methods:**

Assessment method	Grade
First exam	25
Second exam	25
Homework and quizzes	10
Final exam	40
Total	100

### **Alignment of Teaching and Learning Methods, Assessment and Course ILOs:**

Teaching method	Contact Hours	Assessed through	ILOs numbers
Lecturing and Discussions	3	In-class problems, In-class tests and homework	1 – 4

## **Learning References:**

### **1- Textbook (s):**

Fundamentals of analytical chemistry, 9<sup>th</sup> edition, international edition, Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Brooks/Cole, 2014

### **2- References:**

Quantitative chemical analysis, Daniel C. Harris, 8<sup>th</sup> edition, Freeman, 2010

Analytical chemistry, Gary. D. Christian, 5<sup>th</sup> edition, John Wiley and sons, 2005

### **3- Other Resources:**

Lecture room with data show facilities, course notes, Internet

## **Course Policies**

- Attendance Policy: University regulations apply to attendance.
- Academic Honesty: Academic dishonesty is an unacceptable mode of conduct, and will not be tolerated in any form at University of Petra. All persons involved in academic dishonesty and plagiarism in any form will be disciplined in accordance with University rules and regulations.

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