

University of Petra		
Faculty of arts and sciences		
Department of Chemistry		
		كلية الآداب والعلوم قسم الكيمياء

## Course Syllabus

Year: 2019/2020

Semester: First

Course No.	Course Title	Prerequisite	Co-requisite	Credit Hours Lectures/ ECTS: European Credit Transfer System
101343	Instrumental method for chemical analysis	101241	-	3/5

Instructor Name	E-mail	Office No.	Office ext.	Office Hours
DR. ABDEL MNIM ALTWEIQ	aaltweiq@uop.edu.jo	7214	7214	Sun.: 10-11 and 11- 12 Tues.: 9-10 and 13 – 14, Mon., Wed.: 11 <sup>00</sup> - 12 <sup>00</sup>

<b>Course Description</b>	The instrumental methods of analysis are the science of obtaining, processing and communicating information about the composition and the structure of matter. In other words, and it is the art and science of determining what matter is and how much of it exists by using different instrumental methods.
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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 and instrumental chemistry or multi-disciplinary areas involving chemistry.
- To instill in students a sense of enthusiasm for analytical and instrumental chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.

- To generate in students an appreciation of the importance of chemical analysis in an industrial, economic, environmental and social context.

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

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

Course ILOs	Program ILOs	Teaching and Learning Method	Assessment Method
<b>Knowledge (K)</b>			
1. Describe the principles of instrumental analysis including ultraviolet/visible spectroscopy, flame photometer, atomic absorption spectroscopy, x- ray fluorescence, infrared absorption spectroscopy, electro analytical methods, high performance liquid chromatography and gas chromatography.  2. Explain the functions and operations of components of different analytical instruments including ultraviolet/visible spectroscopy, flame photometer, atomic absorption spectroscopy, x- ray fluorescence, infrared absorption spectroscopy, electro-analytical methods high performance liquid chromatography and gas chromatography.	<b>K (3)</b>	Lectures, videos and discussion	First, second and final exams
<b>Intellectual Skills (I)</b>			
1. Estimate chemical data by performing calculations related to Faraday law, Nernst equation, Ohm low, and calculate the concentration by applying the electrochemical methods mention above by the calibration and the normal chemical calculations.	<b>I (2)</b>	Lectures and discussion	First, second and final exams
<b>Transferable Skills (T)</b>			
Problem-solving skills	<b>T (1)</b>		

**Course Schedule:**

Week	Topics	Topic Details	Reference
1	An itroduction to chemical analysis	classical and modern chemical analysis, types of instrumental methods, instrument components, calibration of instrumental methods, selecting an analytical method	The textbook
2	electromagnatic radiation	Properties of electromagnetic radiation, interaction of radiation and matter, beer's law	The textbook
3	Molecular Ultraviolet / Visible spectroscopy	Background, instrumentation, sample preparation, application, advantages and disadvantages.	The textbook
4	Flame photometer	Background, instrumentation, application, advantages and disadvantages.	The textbook
5, 6	Atomic absorption and emission spectroscopy	Background, instrumentation, application, advantages and disadvantages.	The textbook
7	X- ray flourescence	Background, instrumentation, application, advantages and disadvantages.	The textbook
8	Infrared absorption spectrscopy	Molecular vibration, Infrared activity, Sample preparation, instrumentation, application, advantages and disadvantages.	The textbook
9	Electroanalytical methods; pH, potetiometry and ISE	Types, Background, instrumentation, application, advantages and disadvantages.	The textbook
10	Chromatography	General types of chromatography, theories of chromatography	The textbook
11	TLC, HPLC, GC, IC	Background, instrumentation, application, advantages and disadvantages.	The textbook
12	Electrophoreses	Background, instrumentation, application, advantages and disadvantages.	The textbook
13	Videos and Presentations		Internet
14	Scientific visit		RSS

### **Assessment Methods:**

Assessment method	Grade
First exam	25
Second exam	25
Final exam	40
project	10
Total	100

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

Teaching method	Contact Hours	Assessed through	ILOs numbers
Lectures and Discussions	3	Exams	1, 2, 3

### **Learning References:**

<b>1- Textbook:</b>
Principles of Instrumental analysis, 6 <sup>th</sup> Edition, D. A, Skoog, J. Holler & S. R. Crouch, Thomas Brook/Cole, 2007
<b>2- References:</b>
Analytical Analysis - an Introduction, D. A. Skoog, West & J. Holler, 2004
<b>3- Other Resources:</b>
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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