



ASU  
جامعة العلوم التطبيقية الخاصة  
APPLIED SCIENCE PRIVATE UNIVERSITY

AMMAN - JORDAN



المستوى الذهبي

جامعة كل العرب

**Course Syllabus**  
**Faculty of Arts and Science**  
**Academic Department Chemistry**  
**Academic Year 2021/2022 Semester: First**

<b>Course Title :</b>	Instrumental Analysis 1
<b>Course No. :</b>	1722312
<b>Prerequisite :</b>	1722203
<b>Concurrent :</b>	.....
<b>Department :</b>	Chemistry
<b>Coordinator :</b>	Dr. Waed Alahmad
<b>Mode of Instruction</b>	<b><u>Blended Learning</u></b> - 2 hours in-class (Synonym) learning - 1 hour online asynchronous learning using Edu-Gate

**\* Instructor:**

Lecturer	Office Phone	Room No.	Office Hours	E-mail
<i>Dr. Waed Alahmad</i>	1414	221	8.00-9.30 SMTW	<a href="mailto:W_alahmad@asu.edu.jo">W_alahmad@asu.edu.jo</a>

**Course Description**

The purpose of this course is to provide a basic understanding of the principles, instrumentation, and applications of chemical analysis. This course deals with the Analytical Measurements and concerned with a wide variety of instrumentation and quality control fields in particular in Analytical sciences. The requirements for instrumentation will be discussed during this course. These includes: the precision, accuracy, sensitivity, selectivity, detection limit, dynamic range, speed of analysis, cost, safety and automation. It is very important information for our students who studying the instrumental Analysis to teach how to identify the chemical structure from the complementary information afforded by four types of spectra: UV, IR, NMR and MS. So, this course will cover these four instrumentations in details including theoretical background, Applications and solve problems.

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رمز النموذج: UF 28 /2

رقم القرار 24 / 233

تاريخ الاعتماد 2021/10/18



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## Intended Learning Outcomes

Upon the completion of the course, this module should lead to the following learning outcomes:

### **A. Knowledge and Understanding (Student should):**

- A1 Compare and contrast between different instrumental analytical techniques.
- A2 To Set up principles and to know the main concepts and requirements of instrumental analysis such as precision, accuracy, signal to noise ratio, limit of detection, sensitivity, selectivity, etc
- A3 To introduce and illustrate the main concepts related to different instrumental techniques both qualitative and quantitative instruments.

### **B. Cognitive and Intellectual Skills (Student should):**

- B1 To solve problems related to each type of instruments (quantitative analysis)
- B2 Interpret the spectrum, chromatogram.

### **C. Subject Specific Skills (Student should):**

- C1 Online Researching on different topics in different websites of the studied topics.
- C2 Promote problem-solving skills

## Program Learning Outcomes (PLOs):

1.1	Describe the fundamentals of chemistry including structure, reactivity and properties of chemical substances, different situation of reaction and the states of matter.
1.2	Construct essential facts, principles and theories across the four principal areas of chemistry, i.e. analytical, organic, inorganic and physical.
2.1	Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties
2.2	Explain concepts, principles and determine the efficiency of chemical systems by applying mathematical expressions
2.3	Analyze chemical and spectral data to identify and confirm chemical structures as well as determine chemical composition
2.5	Solve the scientific problems using different mechanisms and procedures
3.1	Demonstrate adequate life-long learning skills
3.3	Select appropriate techniques and procedures for chemical synthesis and analysis.
4.3	Interpret data derived from laboratory observations and measurements in terms of their significance and the theory underlying them.

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4.4	Employ computational software's and data- processing skills in handling of chemical information and analysis of chemical data
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Course Learning Outcomes Alignment Matrix							
PLO	A1	A2	A3	B1	B2	C1	C2
1.1	√						
1.2		√					
2.1			√				
2.2					√		
2.3					√		
2.5				√			
3.1						√	
3.3						√	
4.3					√		√
4.4							√

**Course Contents and Schedule**

Week	and Date Day	Topics to be covered	Method of instruction	CLOs	PLOs
1	Mon. 18 <sup>th</sup> Oct.	Preparation of solutions, and unit conversions.	In-class lecture	A1	1.1
	Wed. 20 <sup>th</sup> Oct.	Methods of calibration, Measurement Basics	In-class lecture		
2	Mon. 25 <sup>th</sup> Oct.	Spectrum and electromagnetic radiation, and interaction with matter, theory of excitation and structural requirements for light absorption.	In-class lecture	A2	1.2
	Wed. 27 <sup>th</sup> Oct.		In-class lecture		
3	Mon. 1 <sup>st</sup> Nov.	Spectrum and electromagnetic radiation, and interaction with matter, theory of excitation and structural requirements for light absorption	In-class lecture	A2	1.2
	Wed. 3 <sup>rd</sup> Nov.		In-class lecture		
4	Mon. 8 <sup>th</sup> Nov.	Signals and Noise	In-class lecture <b>Quiz1</b>	A3	2.1
	Wed. 10 <sup>th</sup> Nov.		In-class lecture		
5	Mon. 15 <sup>th</sup> Nov.	An Introduction to Spectrometric. Methods Components of Optical Instruments An Introduction to Optical Atomic Spectrometry	In-class lecture	A3	2.1
	Wed. 17 <sup>th</sup> Nov.		In-class lecture		

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6	Mon. 22 <sup>nd</sup> Nov.	Atomic Absorption and Atomic Fluorescence Spectrometry Atomic Emission Spectrometry	In-class lecture <b>Assignment 1</b>	A2 B2	1.2 2.2
	Wed. 24 <sup>th</sup> Nov.		In-class lecture		
7	Mon. 29 <sup>th</sup> Nov.	Atomic Mass Spectrometry	In-class lecture	B2	2.3 4.3
	Wed. 1 <sup>st</sup> Dec.		In-class lecture		
8.	<b>MID Term Exam</b>				
9	Mon. 13 <sup>th</sup> Dec.	An Introduction to Ultraviolet/Visible Molecular Absorption Spectrometry	In-class lecture	B1	2.5
	Wed. 15 <sup>th</sup> Dec.	Applications of Ultraviolet/Visible Molecular Absorption Spectrometry	Online sessions (asynchronous)		
10	Mon. 20 <sup>th</sup> Dec.	Molecular Luminescence Spectrometry An Introduction to Infrared Spectrometry	In-class lecture	B2	2.3 4.3
	Wed. 22 <sup>nd</sup> Dec.		Quiz 2 Online sessions (asynchronous)		
11	Mon. 27 <sup>th</sup> Dec.	Applications of Infrared Spectrometry	In-class lecture	B2	2.3 4.3
	Wed. 29 <sup>th</sup> Dec.		Online sessions (asynchronous)		
12	Mon. 3 <sup>rd</sup> Jan.	Raman Spectroscopy	In-class lecture	C2	4.3
	Wed. 5 <sup>th</sup> Jan.		Online sessions (asynchronous)		
13	Mon. 10 <sup>th</sup> Jan.	Nuclear Magnetic Resonance Spectroscopy	In-class lecture	C2	4.4
	Wed. 12 <sup>th</sup> Jan.		Assignment 2		
14	Mon. 17 <sup>th</sup> Jan.	Molecular Mass Spectrometry	Online sessions (asynchronous) In-class lecture	C1	3.1
	Wed. 19 <sup>th</sup> Jan.		Online sessions (asynchronous)		
15	Mon. 24 <sup>th</sup> Jan.	Surface Characterization by Spectroscopy and Microscopy	Assignment 3 Online sessions (asynchronous)	C1	3.3
	Wed. 26 <sup>th</sup> Jan.		Online sessions (asynchronous)		
16.	<b>Final Exam</b>				



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## **Grading Plan and Assessment Tools**

Assessment Tools	Weights	Due date
Mid-term	30	TBA
Assignments	10	TBA
Quizzes	10	TBA
Inter active lectures	.....	
Group Work	.....	
Presentation	.....	
Reports	.....	
Project	.....	
Case-Study	.....	
Final Exam	50	TBA

### **Supplementary Reading**

Textbook:

- Douglas A. Skoog, F James Holler and Stanley Crouch (2007) Principles of Instrumental Analysis. 6th Edition or later.

### **References:**

- Contemporary instrumental analysis / by: Rubinson, Kenneth A. Published: (2000)
- Chemical instrumentation: a systematic approach / by: Strobel, Howard A. Published: (1989)



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Subject Coordinator      Dr. Waed Alahmad      Signature: -----

Head of Curriculum Committee      Dr. Hussam Miqdad      Signature: -----

Department Head      Dr. Hussam Miqdad      Signature: -----

Faculty Dean      Dr. Hadeel Ali Saed      Signature: -----

Copy to:

- Department Head.
- Head of Curriculum Committee.
- Course File.

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