



**Course Syllabus**  
**According to JORDAN National Qualification**  
**Framework (JNQF)**

**Course Name: Instrumental analysis**  
**(II)**

**Course Number: 11013235**

**General Course Information:**

Course title	<b>Instrumental analysis (II)</b>
Course number	<b>11013235</b>
<b>Credit hours</b>	<b>3</b>
<b>Education type</b>	<b>[Face-to-Face]</b>
Prerequisites/corequisites	<b>11013133</b>
Academic Program	<b>Bachelor</b>
Program code	<b>01</b>
Faculty	<b>Al-Isra university</b>
Department	<b>Science</b>
Level of course	<b>Chemistry</b>
Academic year /semester	<b>Second year</b>
Awarded qualification	<b>2021/2022- First semester</b>
Other department(s) involved in teaching the course	<b>Bachelor degree in chemistry</b>
Language of instruction	<b>English</b>
Date of production/revision	<b>20/10/2021</b>

**Course Coordinator:**

<b>Coordinator's name</b>	<b>Dr. Samer Al-Awaideh</b>
<b>Office No</b>	<b>4204</b>
<b>Office Phone extension number</b>	<b>2527</b>
<b>Office Hours</b>	<b>10-11 Sunday, 8:30-9:30 Monday, 12-1 Tuesday, 12:30-2 Wednesday, 1-2 Thursday</b>
<b>Email</b>	<b>Samerawaideh@yahoo.com</b>

**Other Instructors:**

<b>Instructor name</b>	<b>Dr. Samer Al-Awaideh</b>
<b>Office No</b>	<b>4204</b>
<b>Office Phone extension number</b>	<b>2527</b>
<b>Office Hours</b>	<b>10-11 Sunday, 8:30-9:30 Monday, 12-1 Tuesday, 12:30-2 Wednesday, 1-2 Thursday</b>
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**Course Description (English/Arabic):**

<b>English</b>	An introduction to principles and applications of instrumental analysis chemistry. Focus areas include chromatography theory (liquid chromatography modes and mechanisms: ion-exchange, adsorption, partition and permeation modes as practiced in high-pressure liquid chromatography, open column, thin layer and paper chromatography, gas chromatography theory: instrumentation and operation, supercritical fluid and capillary methods) and Spectroscopic methods of analysis includes vibrational spectroscopy (FT-IR) and atomic and molecular mass spectrometry. This course is offered with three hours of lecture per week.
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Arabic	مقدمه في مفاهيم و تطبيقات التحليل الكيميائي بالاعتماد على الكروماتوغرافيا بأنواعه المختلفة ( كروماتوغرافيا الغاز والسائل ) وتوضح مبادئ الفصل الكيميائي وكذلك أجهزة التحليل الضوئي و تتضمن أجهزة ( IR , MS ).

**Textbook:** Author(s), Title, Publisher, Edition, Year, Book website.

1. Principles of Instrumental Analysis for Douglas A. Skoog, F. James Holler, Stanley R. Crouch, 6<sup>th</sup> edition, 2013.

**References:** Author(s), Title, Publisher, Edition, Year, Book website.

Analytical Chemistry for Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug, , 7th Edition,

### Course Educational Objectives (CEOs):

1.	Introduce students to the modern instrumental methods of quantitative and qualitative analysis.
2.	To learn about the fundamental principles of operation of instrumental methods
3.	Understands the principles of separation techniques and calculation of concentrations using chromatography.
4.	Understands the infrared instrument and it's application in structure determination .
5.	Understand the principles, limitations and strength of all instrumental techniques .
6.	Construct and interpret chemical structure using mass spectroscopy and infrared instrument.

### Intended Learning Outcomes (ILO's):

1.	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	Descriptors**
2. A	<b>Knowledge and Understanding:</b>				
3. A1	Student will be able to recognize basics and fundamental concepts related to the chromatography and principles of chemical separation and spectroscopic analysis, gas chromatography, liquid chromatography, IR, MS.	1, 2, 4	a	1	K
4. B	<b>Intellectual skills:</b>				
5. B1	Students will be able to solve problems related to chromatography and	3, 4, 5	d	3	S

	concentrations determination using GC, HPLC.				
6. B2	Student will be able to construct a structure of compound using IR, MS spectrum.	5,6	c	4	C
7. B3					
8. C	Subject specific skills:				
9. C1					
10. D	Transferable skills:				
11. D1					

\*Bloom Taxonomy Levels

Level #	1	2	3	4	5	6
Level Name	Knowledge	Comprehension	Application	Analysis	Evaluation	Synthesis

**\*\* Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

### Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (Bachelor in chemistry) program will demonstrate:	Descriptors**		
	K	S	C

1.	Describe the fundamental scientific principles and theories across the four subfields of chemistry (Organic, inorganic, analytical and physical).	✓		
2.	Identify and confirm chemical compounds structures as well as determine chemical composition.	✓		
3.	Establish and concludes mechanisms of physical and chemical processes in addition to the ability of mastering qualitative and quantitative determination.			✓
4.	Solve the scientific problems using different mechanisms and procedures based on critical thinking.		✓	
5.	Conduct scientific experiments in chemistry.			✓
6.	Commitment and interest in lifelong learning, and collaborate effectively with other people in a team.			✓
7.	Prepare logical, organized and concise written reports, and oral and poster presentations that effectively communicate chemical content to other scientists.		✓	
8.	Commitment to the ethical principles of chemical research.			✓
9.	Find information about chemistry through databases and information		✓	
10.	Evaluation of calculations in chemistry experiments and information analysis using computer software.			✓
11.	Demonstrate safety laboratory techniques.		✓	

**\*\* Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

### Weekly Schedule (please choose the type of teaching)

✓ Face to Face

☐ Hybrid (2 Lectures Face – To - Face +1 Lecture Asynchronous)

☐ Hybrid (1 Lectures Face – To - Face +1 Lecture Asynchronous)

☐ Online (2 Lectures Synchronous +1 lecture Asynchronous)

Week	First Hour (face to face)	Second Hour (face to face)	Third Hour (face to face)	Ach. ILOs	Ach. PLOs	Descriptors*
1	Introduction of chromatography	Introduction of chromatography	Introduction of chromatography	1, 2	a	K
2	Introduction of chromatography	Introduction of chromatography	Introduction of chromatography	1, 2	a	K
3	Introduction of chromatography	Introduction of chromatography	Introduction of chromatography	1, 2	d	S
4	Introduction of chromatography	Introduction of chromatography	Introduction of chromatography	1, 2	a	K
5	Gas chromatography	Gas chromatography	Gas chromatography	1, 2	d	S
6	Gas chromatography	Gas chromatography	Gas chromatography	1, 2	a	K
7	Gas chromatography	Gas chromatography	Gas chromatography	1, 2	d	S
8	HPLC	HPLC	HPLC	1, 2	a	K
9	HPLC	HPLC	HPLC	1, 2	d	S
10	Supercritical fluid chromatography	Supercritical fluid chromatography	Supercritical fluid chromatography	1, 2	a	K

11	Capillary electrophoreses, Capillary electro chromatography, and field flow fractionation	<b>Capillary electrophoreses, Capillary electro chromatography, and field flow fractionation</b>	Capillary electrophoreses, Capillary electro chromatography, and field flow fractionation	1, 2	d	S
12	Molecular Mass spectroscopy	<b>Molecular Mass spectroscopy</b>	Molecular Mass spectroscopy	1, 2, 3	a	K
13	Molecular Mass spectroscopy	<b>Molecular Mass spectroscopy</b>	Molecular Mass spectroscopy	1, 2, 3	c	C
14	An introduction to Infrared Spectroscopy	<b>An introduction to Infrared Spectroscopy</b>	An introduction to Infrared Spectroscopy	1, 2, 3	a	K
15	Applications of Infrared spectrometry	<b>Applications of Infrared spectrometry</b>	Applications of Infrared spectrometry	1, 2, 3	c	C

\* K: Knowledge, S: Skills, C: Competency

## Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Interactive videos
- Practice Labs
- Discussion Forums
- Quizzes
- Other Interactive online activities
- Reports

## Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20 %**
- Midterm **30 %**
- Final Exam **50 %**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

## Required equipment:

- PC / Laptop with webcam and mic
- Internet Connection
- Access to the IU E-Learning Platform at: <https://elearn.iu.edu.jo/>
- E-learning plan

- Satisfaction questionnaires for online and face-to-face learning
- Software for e-learning
- Training

### Assessment Tools implemented in the course:

- ✓ Final Exam
- ✓ Midterm Exam
- Quizzes
- ✓ Homework
- Practice Labs
- Discussion Forums
- Periodic reports for learning assessment
- Improvement plans for online or face-to-face teaching
- Others:.....

### Responsible Persons and their Signatures:

Course Coordinator	Dr. Samer Al-waideh	Completed Date	20/10 / 2021
		Signature	Samer Al-waideh
Received by (Department Head)		Received Date	21/10/2021
		Signature	