

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

**University of Anbar
Educational collage for Pure Sciences
Chemistry Department**

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: *University of Anbar*

Faculty/Institute: *College of Education for Pure Science*

Scientific Department: *Chemistry*


Academic or Professional Program Name: *Chemistry science education*

Final Certificate Name: *Bachelor of Education in Chemistry Sciences*

Academic System: *Quarterly*

Description Preparation Date: *3/3/2024*

File Completion Date: *20/3/2024*

Signature: 

Head of Department Name:

*Assist. Prof. Dr. Mohammed
Abed Kadhim*


Date: *2024/4/8*

Signature: 

Scientific Associate Name:

*Assist. Prof. Dr. Harith Kamel
Benya*

Date: *2024/4/8*

The file is checked by: 

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Assist. Prof. Dr. Firas Shaker Mahmoud

Date: *2024/4/8*

Signature:


Prof. Dr. Abdul Rahman Salman. Juma

Approval of the Dean



1. Program Vision

The Department of Chemistry Sciences at the College of Education for Pure Sciences is keen to consolidate the scientific excellence of the students of the department and to emphasize the modern information and knowledge in the various fields of chemistry. The department also seeks to develop the students' individual skills and experiences to achieve a better career future. Thus, the Department of Chemistry Sciences contributes to the performance of the academic mission that the Department of Chemistry aspires to. Through the College of Education for Pure Sciences, as well as through the University of Anbar. In addition, the department seeks to create a distinguished quality of high-level graduates who have an academic background that combines the basic knowledge and skills required to be able to meet the needs of contemporary society.

2. Program Mission

The Department of Chemistry, through its mission, seeks to prepare and prepare students who are scientifically and practically skilled in the various fields of chemistry and its applications, as well as to provide solid and advanced scientific research. Which serves the local, regional and international environment, and the message of the Department of Chemistry is an integral part of the mission of the College of Education for Pure Sciences, which strives to provide the community with qualified scientific cadres to solve all the problems faced by the community. Science according to correct scientific methods and work honestly in order to carry out all teaching tasks to graduate a generation qualified scientifically and practically to serve our dear society.

3. Program Objectives

1. Prepare the teaching staff in secondary schools qualified scientifically and educationally majoring in chemistry to supplement maintain schools and cover their needs.

2. keep up with modern scientific and technological developments in all disciplines of fine chemistry.

3. The section aims to excellence by focusing on the importance of having the educational process outputs majoring in chemistry, it has managed many graduates compete with their peers from the departments of chemistry graduates in the faculties of science and educational kyat other graduate inside

and outside the country and acting career.

4. Section has achieved an advanced level on the proportion of the country most of the subjects in the course of the ministerial exams and get a lot of professors and head of the department on the first place for several years where he was honored by the Minister of Higher Education and Scientific Research, in a timely manner

5. Section contributed in cooperation with local institutions and multiple ministries and the establishment of seminars, conferences and lectures and laboratory sessions for teachers in the Ministry of Education.

6. Prepare cadres teaching for postgraduate studies (Master's and PhD) in the various disciplines of chemistry to supplement section and colleges, but other scientific energies specialized in chemistry to become professors in the department or university colleges or universities in the country other.

7. Section joins the requested scientific visits and field trips as well as leisure trips to see the archaeological and scientific industrial sites to take advantage of them.

8. section is intended to embody the slogan Pure Faculty of Education, Science and dissemination of scientific culture and the consolidation of morality and be part students in the near future, God willing, representing a decent place among the brothers who preceded them.

9. Section aims to their students embody the university's mission and objectives, including acquired from the science and knowledge and translated this science to work hard to be sincere when Hassan age of their professors who did not donating them aware of what is good for them and work to build their personality.

10 - Post section chemical consultancy in the Faculty Advisory Office to address the difficulties experienced by many industries, including industry (medicines, detergents, dyes, perfumes, plastics, cement, glass, ceramics, phosphate fertilizers, chemical pesticides).

4. Program Accreditation

Procedures have been initiated to obtain accreditation according to the national standards for accrediting the programs of the educational group colleges in 2024.

5. Other external influences

Postponing the start of the academic year for first-year students

Practical graduation research projects

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	16	11%	Basic
College Requirements	11	22	17%	basic
Department Requirements	36	110	72%	32 basic 4 optional
Summer Training				
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Level/ Year	Course or Module Code	Course or Module Title	Weekly hours	
			Lec.	Lab.
First	CHEM111	Analytical Chemistry 1	2	2
	CHEM121	organic chemistry 1	2	2
	CHEM131	inorganic chemistry 1	2	0
	CHEM181	Chemical safety and security	2	-
	CHEM112	Analytical Chemistry 2	2	2
	CHEM122	organic chemistry 2	2	2
	CHEM132	inorganic chemistry 2	2	0
	BIO120	Biology	2	2
	EPS101	educational psychology	2	-
	EPS102	Education principles	2	-
	UOA140	English language 1	2	-

	UOA135	Human rights and democracy	۲	-
	UOA137	Arabic language 1	۲	-
	UOA141	Computer	۱	۲
	MAT105	Calculus 1	۲	-
	MAT113	Calculus 2	۲	-
Second	CHEM213	Analytical Chemistry 3	۲	۲
	CHEM223	Organic Chemistry 3	۲	۲
	CHEM233	Inorganic Chemistry 3	۲	۲
	CHEM241	Physical Chemistry 1	۲	۲
	CHEM214	Analytical Chemistry 4	۲	۲
	CHEM224	Organic Chemistry 4	۲	۲
	CHEM234	Inorganic Chemistry 4	۲	۲
	CHEM242	Physical Chemistry 2	۲	۲
	EPS202	Developmental Psychology	۲	-
	EPS201	Educational Management	۲	-
	EPS211	Scientific Research Methodolgy	۲	-
	UOA240	Arabic Language 2	۲	-
	UOA241	Computer	۱	۲
	MAT	Mathematics	۲	-
Third	CHEM351	Biochemistry 1	۲	۲
	CHEM325	Organic Chemistry 5	۲	۲
	CHEM331	Inorganic Chemistry 5 (Coordination)	۲	۲
	CHEM341	Physical Chemistry 3	۲	۲
	CHEM361	Industrial Chemistry 1	۲	-
	CHEM352	Biochemistry2	۲	۲
	CHEM326	Organic Chemistry 6	۲	۲
	CHEM332	Inorganic Chemistry 6 (Coordination)	۲	۲
	CHEM342	Physical Chemistry 4	۲	۲
	CHEM362	Industrial Chemistry 2	۲	-
	EPS311	Curriculum and teaching method	۲	-
	EPS312	Counseling and mental healt	۲	-

	UOA340	English Language 3	۲	-
Fourth	CHEM453	Biochemistry 3	۲	-
	CHEM427	Organic identification	۲	۲
	CHEM415	Instrumental Analysis 1	۲	۲
	CHEM445	Physical Chemistry (Quantum)	۲	-
	CHEM463	Industrial Chemistry 3	۲	۲
	CHEM454	Biochemistry 4	۲	-
	CHEM428	Organic identification 2	۲	۲
	CHEM416	Instrumental Analysis 2	۲	۲
	CHEM446	Physical Chemistry (Quantum)	۲	-
	CHEM464	Industrial Chemistry 4	۲	۲
	EPS411	measuring and evaluating	۲	-
	EPS412	teaching apps	۲	-
	EPS413	school apps	-	۴
	CHEM491	Graduation Project	۲	-

8. Expected learning outcomes of the program

Knowledge

A1. Enable the student to acquire theoretical knowledge of chemistry.
A2. Empowering the student how to teach and ways of communicating scientific information to students.
A3. The student's knowledge of the methods of measurement and evaluation and methods of modern teaching methods in chemistry.
A4. The student is acquainted with the educational material by providing it electronically in the virtual classroom. In addition to enabling the student to know the learning theories related to the ages of students for the secondary school stage.

1. The method of listening and thinking deeply in order to understand the problem to solve it.
2. The method of scientific discussion and meaningful dialogue.
3. Adopting the method of monthly and final exams and submitting weekly reports.

Skills

B1. Gaining knowledge and enriching the student with the methods of laboratory work.

1. The method of listening and thinking deeply in order to understand the problem to

<p>B2. Orienting the student to the scientific method in solving all scientific problems.</p> <p>B3. Knowing the objectives and origins of the art of teaching chemistry.</p> <p>B4. Enabling students to acquire the skills of using virtual classrooms</p>	<p>solve it.</p> <p>2. The method of scientific discussion and meaningful dialogue.</p> <p>3. Adopting the method of monthly and final exams and submitting weekly reports.</p>
<p>Ethics</p>	
<p>C1. Adopting the method of dialogue between the student and the professor.</p> <p>C2. Interest in research projects and preparing organized reports</p> <p>C3. Adopt the method of discussion. (Performance tests and seminars).</p> <p>C4. Adopting e-learning to provide an interesting and flexible learning environment.</p>	<p>1. Method of application in research laboratories</p> <p>2. Adopting the method of constructive dialogue and discussion</p> <p>3. Adopt the trial-and-error method.</p> <p>4. The adoption of multimedia in the virtual classes (image, text, audio, video)</p>

<p>9. Teaching and Learning Strategies</p>
<p>1- The method of listening and thinking deeply for the purpose of understanding the problem to solve it</p> <p>2- Adopting the method of dialogue and constructive purposeful discussion</p> <p>3- Adopting the method of trial and error</p> <p>4- Adopting the method of monthly and final examinations and submitting weekly reports</p>

<p>10. Evaluation methods</p>
<p>1- Preparing the seminar research (graduation research).</p> <p>2- Adopting the grading method as a basis for the evaluation process.</p> <p>3- Adopting the testing method.</p>

4- Adopting the method of discussions and dialogues between students and the professor

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr		o			o	
Assist. Prof.		√			√	
Lecturer		√			√	
Assistant Lecturer	1.				1.	

Professional Development

Mentoring new faculty members

1- Working to enhance the student's self-confidence through scientific focus on positive behaviors and contributors and creating a broad and diverse personality in community development to carry creative integrity in professional life.

2- Ensuring the exchange of experiences and visits made by the teaching staff to universities outside Iraq because of its effective role in reformulating curricula, including the educational development service.

Professional development of faculty members

Developing curricula by continuously keeping pace with the development taking place in the study programs of the corresponding departments in international universities in the nature of the study materials that meet the need and the extent to which they cover the requirements of the productive and academic activities of the beneficiaries.

12. Acceptance Criterion

- 1. Acceptance according to the general and central average system.**
- 2. Admission to departments according to the student's desire and modified.**
- 3. The condition must be exclusively for a graduate of preparatory school and the scientific stream.**
- 4. The college's absorptive capacity.**

13. The most important sources of information about the program

1. Methodological books approved by the sectoral committee for colleges of education for pure sciences.
2. Helping books.
3. Books and archaeological sources / sources in English.
4. Additional sources from the Internet.

14. Program Development Plan

1. Developing curricula through the use of modern scientific sources through continuous keeping up with the development taking place in the study programs of the corresponding departments in international universities in the nature of the study materials that meet the need and the extent to which they cover the requirements of the productive and academic activities of the beneficiaries.
2. Work to enhance the student's self-confidence by focusing on positive behaviors and effective contributions to building a personality that is aware of its role in developing society and capable of carrying academic and moral integrity in their professional lives.
3. Visits and practical practices in service laboratories
4. Acquiring modern scientific experiences and skills in the field of modern technical communication

Curriculum Skills Map

				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
First	CHEM111	Analytical Chemistry 1	core	√	√	√		√				√	√			√			
	CHEM121	organic chemistry 1	core	√	√	√		√				√	√			√			
	CHEM131	inorganic chemistry 1	core	√	√	√		√				√	√			√			
	CHEM181	Chemical safety and security	Option	√	√	√		√				√	√			√			
	CHEM112	Analytical Chemistry 2	core	√	√	√		√				√	√			√			
	CHEM122	organic chemistry 2	core	√	√	√		√				√	√			√			
	CHEM132	inorganic chemistry 2	core	√	√	√		√				√	√			√			
	BIO120	Biology	core		√	√		√					√			√			√
	EPS101	educational psychology	core				√			√				√		√			√
	EPS120	Education principles	core				√			√				√		√			√
	UOA140	English language 1	core		√						√			√		√			
	UOA135	Human rights and democracy	core				√			√				√					
	UOA137	Arabic language 1	core				√				√			√					
	UOA141	Computer	core		√		√				√				√				√
	METH	Calculus 1	core		√	√			√								√		
METH	Calculus 2	core		√	√			√								√			

Curriculum Skills Map

Programme Learning Outcomes

Year / Level	Course Code	Course Title	Core (C) or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development				
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
Second	CHEM213	Analytical Chemistry 3	core	√	√	√		√				√	√				√			
	CHEM223	Organic Chemistry 3	core	√	√	√		√				√	√				√			
	CHEM233	Inorganic Chemistry	core	√	√	√		√				√	√				√			
	CHEM241	Physical Chemistry 1	core	√	√	√		√				√	√				√			
	CHEM214	Analytical Chemistry 4	core	√	√	√		√				√	√				√			
	CHEM224	Organic Chemistry 4	core	√	√	√		√				√	√				√			
	CHEM234	Inorganic Chemistry 4	core	√	√	√		√				√	√				√			
	CHEM242	Physical Chemistry	core	√	√	√		√				√	√				√			
	EPS101	Developmental Psychology	core							√		√				√			√	
	EPS120	Educational Management	core				√			√					√	√	√	√		
	EPS211	Scientific Research Methodology	core				√						√		√		√			√
	UOA240	English Language 2	core						√		√				√	√				
	UOA241	Computer	core					√	√				√				√			

Curriculum Skills Map

please tick in the relevant boxes where individual Programmed Learning Outcomes are being assessed

				Programmed Learning Outcomes																
Year / Level	Course Code	Course Title	Core (C) or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development				
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
Third	CHEM351	Biochemistry 1	core	√	√	√		√	√								√			
	CHEM325	Organic Chemistry 5	core	√	√	√		√	√								√			
	CHEM331	Inorganic Chemistry 5 (Coordination)	core	√	√	√		√	√								√			
	CHEM341	Physical Chemistry 3	core	√	√	√		√	√								√			
	CHEM361	Industrial Chemistry 1	core	√	√	√		√	√								√			
	CHEM352	Biochemistry2	core	√	√	√		√	√								√			
	CHEM326	Organic Chemistry 6	core	√	√	√		√	√								√			
	CHEM332	Inorganic Chemistry 6 (Coordination)	core	√	√	√		√	√								√			
	CHEM342	Physical Chemistry 4	core	√	√	√		√	√								√			
	CHEM362	Industrial Chemistry 2	core	√	√	√		√	√								√			
	EPS311	Curriculum and teaching methods	core				√			√	√			√	√	√	√	√	√	√
	EPS312	Counseling and mental health	core				√			√			√			√				
	UOA340	English Language 3	core		√						√				√		√			√

Curriculum Skills Map

				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Fourth	CHEM453	Biochemistry 3	Core	√	√	√		√	√			√	√				√		
	CHEM427	Organic identification 1	Core	√	√	√		√	√			√	√				√		
	CHEM415	Instrumental Analysis 1	Core	√	√	√		√	√			√	√				√		√
	CHEM445	Physical Chemistry (Quantum)	Core	√	√	√		√	√			√	√				√	√	√
	CHEM463	Industrial Chemistry 3	Core	√	√	√		√	√			√	√				√	√	√
	CHEM454	Biochemistry 4	Core	√	√	√		√	√			√	√				√	√	√
	CHEM428	Organic identification 2	Core	√	√	√		√	√			√	√				√		
	CHEM416	Instrumental Analysis 2	Core	√	√	√		√	√			√	√				√		
	CHEM446	Physical Chemistry (Quantum)	Core	√	√	√		√	√			√	√				√		
	CHEM464	Industrial Chemistry 4	Core	√	√	√		√	√			√	√				√		
	UOA440	English language	Core		√	√											√		
	EPS411	measuring and evaluating	Core			√						√			√		√	√	
	EPS412	teaching apps	Core			√					√	√		√	√		√	√	
	EPS413	school apps	Core								√	√		√	√		√	√	
	CHEM491	Graduation Project	Core					√				√		√			√	√	

Course Description Form

1. Course Name:	
Analytical Chemistry1 / The first stage	
2. Course Code:	
Chem101	
3. Semester / Year:	
first semester/2023-2024	
4. Description Preparation Date:	
14/3/2024	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hr./	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Bashar Abdulazeez Mahmood Email: bashar.abdulaziz@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to convey a general idea about Analytical chemis Some students are also given skills that make them familiar with the m important threads. They gain experimental experience and follow up the progress of the technical components over time
9. Teaching and Learning Strategies	
Strategy	1. Adopting the method of dialogue between the student and the professor 2-Preparing organized reports 3-Adopting the discussion method

10. Course structure					
Evaluation method	Teaching method	Name of unit/course or subject	Required learning outcomes	Hours	Week
Monthly exams	Blackboard and data show	Safety and Hazard Compounds	Understand the lecture topic	2 Theoretical + 3 practical	1
Monthly exams	Blackboard and data show	The scope of analytical chemistry	Understand the lecture topic	2 Theoretical + 3 practical	2
Monthly exams	Blackboard and data show	Solutions Classification of solution	Understand the lecture topic	2 Theoretical + 3 practical	3
Monthly exams	Blackboard and data show	Electrolytes and non-electrolytes	Understand the lecture topic	2 Theoretical + 3 practical	4
Monthly exams	Blackboard and data show	Acid-base theories	Understand the lecture topic	2 Theoretical + 3 practical	5
Monthly exams	Blackboard and data show	Salts	Understand the lecture topic	2 Theoretical + 3 practical	6
Monthly exams	Blackboard and data show	Dissociation of water	Understand the lecture topic	2 Theoretical + 3 practical	7
Monthly exams	Blackboard and data show	p – Function	Understand the lecture topic	2 Theoretical + 3 practical	8
Monthly exams	Blackboard and data show	Stoichiometric Calculations	Understand the lecture topic	2 Theoretical + 3 practical	9
Monthly exams	Blackboard and data show	Mole Concept	Understand the lecture topic	2 Theoretical + 3 practical	10

Monthly exams	Blackboard and data show	Methods of expressing concentration of solutions	Understand the lecture topic	2 Theoretical + 3 practical	11
Monthly exams	Blackboard and data show	Diluting Solutions	Understand the lecture topic	2 Theoretical + 3 practical	12
Monthly exams	Blackboard and data show	The relationship between molarity, normality and part per million	Understand the lecture topic	2 Theoretical + 3 practical	13
Monthly exams	Blackboard and data show	Titer expression of concentration	Understand the lecture topic	2 Theoretical + 3 practical	14
Monthly exams	Blackboard and data show	H.W	Understand the lecture topic	2 Theoretical + 3 practical	15

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books any)	Analytical Chemistry -Fundamentals of Analytical Chemistry- Dou A. Skoog- 8 edition – USA
Main references (sources)	Analytical Chemistry” by Gary D. Christian, Purnendu K. (Sandy) Dasgupta, Kevin A. Schug, 7th Edition, 2014. principles of Instrumental Analysis, Skoog, Douglas A. West Donald M, UK
Recommended books and references (scientific journals, reports...)	CATHERINE E. HOUSECROFT AND ALAN G. SHAR INORGANIC CHEMISTRY
Electronic References, Websites	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions

Course Description Form

13.	Course Name:	Inorganic chemistry1
14.	Course Code:	CHEM131
15.	Semester / Year:	first semester/2023-2024
16.	Description Preparation Date:	14/3/2024
17.	Available Attendance Forms:	Daily, at the time specified in the schedule, and at full time
18.	Number of Credit Hours (Total) / Number of Units (Total)	30hr./2Units
19.	Course administrator's name (mention all, if more than one name)	
	Name: Zeyad Khudher Abdulrazzaq	
	Email: zeyad.kudher@uoanbar.edu.iq	
20.	Course Objectives	
Course Objectives	<p>The purpose of the article is to study the main topics: Definition of student on 1. Corn structure two. Electromagnetic radiation 3. The origin of quantum theory 4. Black body radiation 5. Electrical effect 6. Einstein's explanation for photo effect 7. Atomic Spectra 8. The linear spectrum of hydrogen corn 9. Arthur's 10th theory. Port 11 theory. Port's developed theory 12. Ziman's 13. Basic rules for route 14 mechanic. Heisenberg Base at 15th Precinct.Schrodenker's 16 equation. Solve Schrodenker 17.Number 18. The physical meaning of the count of 19. The forms of robotics are s,p,d,f,g 20. Case code 21. Periodic table of elements Introduction 22. Periodic characteristics of elements 23. The blockage.</p>	
21.	Teaching and Learning Strategies	
Strategy	<p>Knowledge of ancient and modern theories in the interpretation of the structure of the atom Allowing students to acquire the theoretical scientific knowledge of inorganic chemistry and its compounds and the theoretical basis of quantum chemistry. Define the student by how to solve the mathematical issues of quantum numbers and code of status and blockage. The student is well aware of the theoretical basis for interpretation of the structure of the atom and the probability of the existence of electrons according to classical and modern theories. The student has mastered the knowledge of inorganic compounds and what their physical and chemical behavior is.</p>	

22. Course Structure

The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	2 theoretical + 2 practical	The structure of the electromagnetic atom.	General introduction	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	2 theoretical + 2 practical	The origin of quantum theory.	General introduction	Lecture + laboratory	Weekly and monthly exams
3	2 theoretical + 2 practical	Black body radiation.	General introduction	Lecture + laboratory	And laboratory reports
4	2 theoretical + 2 practical	Einstein's explanation for the atomic photofiring effect. The linear spectacle of hydrogen atom is the theory of Rutherford.	General introduction	Lecture + laboratory	Weekly and monthly exams
5	2 theoretical + 2 practical	Burr's theory. Port's developed theory.	Burr's theory. Port's developed theory.	Lecture + laboratory	And laboratory reports
6	2 theoretical + 2 practical	Ziman's effect is the basic rules of the orientation mechanic.)	the basic rules of the mechanic	Lecture + laboratory	Weekly and monthly exams
7	2 theoretical + 2 practical	The Heisenberg base is in precision and Schrodener's equation.	Schrodener's equation	Lecture + laboratory	And laboratory reports
8	2 theoretical + 2 practical	Solve Schrodener's equation.		Lecture + laboratory	Weekly and monthly exams
9	2 theoretical + 2 practical	Set up the quantum physical meaning of the quantum numbers.	Alkanes	Lecture + laboratory	And laboratory reports
10	2 theoretical + 2 practical	The forms of robotics are s,p,d,f,g.	CycloAlkanes	Lecture + laboratory	Weekly and monthly exams

	practical				
11	∇ theoretical + 2 practical	Status code Periodic table of elements	CycloAlkanes	Lecture + laboratory	And laboratory reports
12	∇ theoretical + 2 practical	Periodic characteristics of components		Lecture + laboratory	Weekly and monthly exams
13	∇ theoretical + 2 practical	Properties of alkenes - Reaction of alkenes		Lecture + laboratory	And laboratory reports
14	∇ theoretical + 2 practical	Shielding	Shielding	Lecture + laboratory	Weekly and monthly exams
15	∇ theoretical + 2 practical	Atomic radius.	Atomic radius.	Lecture + laboratory	And laboratory reports

23. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Modern inorganic chemistry, dr. basym Saadi.
Main references (sources)	1. The foundations of inorganic chemistry Dr..Muhammad Majdi continues. 2. Inorganic chemistry D. Essam Jarjij Slomi 3. Inorganic chemistry Talif Gary L. Messler and Donald A.
Recommended books and references (scientific journals, reports...)	4- CATHERINE E. HOUSECROFT AND ALA G. SHARPE INORGANIC CHEMISTRY
Electronic References, Websites	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions

Course Description Form

1. Course Name:	
Analytical Chemistry, Laboratory	
2. Course Code:	
CHEM111	
3. Semester / Year:	
first semester/2023-2024	
4. Description Preparation Date:	
12/11/2023	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
33 hr./36 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Ruaa Mahdi Saleh Email: eps.ruaamehdi.salih@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	Knowing chemistry as a knowledge science and getting to know its specializations, especially chemical analysis in action, especially in preparing the required amount of material. Knowing studying ways to express different types of discrimination and studying descriptive analysis methods
9. Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none"> - Introducing the student to methods of laboratory detection substances -Enable the student to obtain scientific knowledge in analytical chemistry -The student must be proficient in conducting practical experiments and using devices efficiently. -To master the methods of detecting the required chemical compounds

10-Course structure					
The week	The number of the hours	Required learning outcomes	Subject name	Teaching method	Evaluation methods
١	3 hours	Learn about analytical chemistry and its branches	Learn about laboratory safety precautions	Laboratory	Oral exams monthly exams For quarterly exams
٢	3 hours	Identify laboratory equipment and tools	Identify laboratory equipment and tools	Laboratory	Oral exams monthly exams For quarterly exams
٣	3 hours	Learn about analytical chemistry and its branches	Learn about analytical chemistry and its branches	Laboratory	Oral exams monthly exams For quarterly exams
٤	3 hours	Positive ion analysis	Positive ion analysis The first group	Laboratory	Oral exams monthly exams For quarterly exams
٥	3 hours	Positive ion analysis	Positive ion analysis The second group	Laboratory	Oral exams monthly exams For quarterly exams
٦	3 hours	Positive ion analysis	Positive ion analysis The third group	Laboratory	Oral exams monthly exams For quarterly exams
7	3 hours	Positive ion analysis	Positive ion analysis The Fourth group	Laboratory	Oral exams monthly exams For quarterly exams

8	3 hours	Positive ion analysis	Positive ion analysis The Fifth group	Laboratory	Oral exams monthly exams For quarterly exams
9	3 hours	Detection of the unknown ion	Detection of the unknown ion	Laboratory	Oral exams monthly exams For quarterly exams

10. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Analytical Chemistry -Fundamentals of Analytical Chemistry- Douglas A. Skoog- 8 edition - USA
Main references (sources)	Analytical Chemistry” by Gary D. Christian, Purnendu K. (Sandy) Dasgupta, Kevin A. Schug, 7th Edition, 2014.
Recommended books and references (scientific journals, reports...)	Analytical Chemistry -Fundamentals of Analytical
Electronic References, Websites	Practical experiments on the Internet

Course Description Form

1. Course Name:	
Analytical Chemistry, Laboratory ^Y	
2. Course Code:	
CHEM111	
3. Semester / Year:	
second semester/2023-2024	
4. Description Preparation Date:	
14/3/2024	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
٤٤ hr./٣٦ Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Ruaa Mahdi Saleh Email: eps.ruaamehdi.salih@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	Knowing chemistry as a knowledge science and getting to know its specializations, especially chemical analysis in action, especially in preparing the required amount of material. Knowing studying ways to express different types of discrimination and studying descriptive analysis methods
9. Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none"> - Introducing the student to methods of laboratory detection substances -Enable the student to obtain scientific knowledge in analytical chemistry -The student must be proficient in conducting practical experiments and using devices efficiently. -To master the methods of detecting the required chemical compounds

١٠- Course structure					
The week	The number of the hours	Required learning outcomes	Subject name	Teaching method	Evaluation methods
١	3 hours	Learn about analytical chemistry and its branches	Learn about laboratory safety precautions	Laboratory	Oral exams monthly exams For quarterly exams

٢	3 hours	Identify laboratory equipment and tools	Identify laboratory equipment and tools	Laboratory	Oral exams monthly exams For quarterly exams
٣	3 hours	titration and standard solutions	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٤	3 hours	Preparation of solid and liquid solutions	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٥	3 hours	Prepare an initial standard solution	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٦	3 hours	Determine the concentration of hydrochloric acid by titration with sodium carbonate	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٧	3 hours	Determination of chloride by Moore's method	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٨	3 hours	Estimation of total hardness	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams
٩	3 hours	Determine the concentration of hydrochloric acid by titration with sodium carbonate	Methods of expressing the concentration of solutions	Laboratory	Oral exams monthly exams For quarterly exams

10. Course Evaluation

Distributing the score out of 30 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Analytical Chemistry -Fundamentals of Analytical Chemistry- Douglas A. Skoog- 8 edition - USA
Main references (sources)	Analytical Chemistry” by Gary D. Christian, Purnendu K. (Sandy) Dasgupta, Kevin A. Schug, 7th Edition, 2014.
Recommended books and references (scientific journals, reports...)	Analytical Chemistry -Fundamentals of Analytical
Electronic References, Websites	Practical experiments on the Internet

Course Description Form

25.	Course Name:	inorganic chemistry 2					
26.	Course Code:	Chem 131					
27.	Semester / Year:	second semester/2023-2024					
28.	Description Preparation Date:	1/4/2024					
29. Available Attendance Forms:		Daily, at the time specified in the schedule, and at full time					
30. Number of Credit Hours (Total) / Number of Units (Total)		30 hr./2 Units					
31.	Course administrator's name (mention all, if more than one name)	Name: Saja Saadoun Faris Email: saja.saadoun@uoanbar.edu.iq					
32.	Course Objectives	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Course Objectives</td> <td>This course aims to Introduce the student to the properties of the elements of the periodic table, the properties of ionic compounds, and theories of interpretation of covalent compounds .</td> </tr> </table>				Course Objectives	This course aims to Introduce the student to the properties of the elements of the periodic table, the properties of ionic compounds, and theories of interpretation of covalent compounds .
Course Objectives	This course aims to Introduce the student to the properties of the elements of the periodic table, the properties of ionic compounds, and theories of interpretation of covalent compounds .						
33.	Teaching and Learning Strategies	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Strategy</td> <td> <ul style="list-style-type: none"> Enabling the student to obtain theoretical scientific knowledge inorganic chemistry and its compounds and the foundations of periodic table classification. Introducing the student to the types of chemical bonds Introducing the student to the characteristics of ionic compounds and the method of ionic bonding. The student must master the knowledge of covalent compounds and their stereoscopic shapes. </td> </tr> </table>				Strategy	<ul style="list-style-type: none"> Enabling the student to obtain theoretical scientific knowledge inorganic chemistry and its compounds and the foundations of periodic table classification. Introducing the student to the types of chemical bonds Introducing the student to the characteristics of ionic compounds and the method of ionic bonding. The student must master the knowledge of covalent compounds and their stereoscopic shapes.
Strategy	<ul style="list-style-type: none"> Enabling the student to obtain theoretical scientific knowledge inorganic chemistry and its compounds and the foundations of periodic table classification. Introducing the student to the types of chemical bonds Introducing the student to the characteristics of ionic compounds and the method of ionic bonding. The student must master the knowledge of covalent compounds and their stereoscopic shapes. 						
34. Course Structure							
The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method		
1	2 theoretical	Periodic table classification	Classification of the periodic table into sectors, cycles, and groups, and the electronic arrangement of each cycle.	Lecture	Class tasks and monthly exams		
2	2 theoretical + 2 practical	Properties of the periodic table	the periodic properties of elements, which are	Lecture	Class tasks and monthly exams		

			atomic size, ionization energy, electronegativity, and electronic affinity.		
۳	۲ theoretical + 2 practical	Types of chemical bonds	Methods for determining the type of chemical bond.	Lecture	Class tasks and monthly exams
۴	۲ theoretical + 2 practical	Properties of ionic compounds	The ability of ionic compounds to conduct electricity, as well as their melting and boiling points.	Lecture	Class tasks and monthly exams
۵	۲ theoretical	Polarization of ionic compounds	Distinguish between polarity and polarity of ionic compounds	Lecture	Class tasks and monthly exams
6	۲ theoretical	Crystal structure for ionic compounds	Determine the unit cell and determine the locations of atoms within the crystal.	Lecture	Class tasks and monthly exams
7	۲ theoretical	First month exam	First month exam	Lecture	Class tasks and monthly exams
8	۲ theoretical	Covalent compounds and their properties	Conditions for forming a covalent bond.	Lecture	Class tasks and monthly exams
9	۲ theoretical	Lewis theory	Lewis octet construction of covalent compounds	Lecture	Class tasks and monthly exams
10	۲ theoretical	Valence bond theory	Explaining the formation of the covalent bond between the two atoms.	Lecture	Class tasks and monthly exams
11	۲ theoretical	Molecular orbital theory	Explanation of the combination of atomic orbitals to form molecular orbitals.	Lecture	Class tasks and monthly exams
12	۲ theoretical	Overlap Between Atomic Orbitals	Interpretation of linear interference of atomic orbitals.	Lecture	Class tasks and monthly exams
13	۲ theoretical	Second month exam	Second month exam	Lecture	Class tasks and monthly exams

14	۳ theoretical	Hybridization	Arranging the electronic density of the orbitals in the valence shell to obtain the hybrid orbitals. .	Lecture	Class tasks and monthly exams
15	۳ theoretical	Structure of covalent compounds	The Structure of the molecule according to the repulsion of the electronic pairs.	Lecture	Class tasks and monthly exams

35. Course Evaluation

Distribution of the score out of ۱۰۰ according to the tasks assigned to the student, such as participation, daily assignments, oral and monthly exams, and final examsetc.

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Modern inorganic chemistry, Dr. Bassem Al-Saadi
Main references (sources)	1- Modern Inorganic Chemistry, Dr. Sajid Mahmood Latif 2- Inorganic Chemistry Dr. Issam Gergish Saloumi
Recommended books and references (scientific journals, reports...)	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions
Electronic References, Websites	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions

Course Description Form

37.	Course Name:	organic chemistry1
38.	Course Code:	Chem 102
39.	Semester / Year:	first semester/2023-2024
40.	Description Preparation Date:	12/11/2023
41.	Available Attendance Forms:	Daily, at the time specified in the schedule, and at full time
42.	Number of Credit Hours (Total) / Number of Units (Total)	75hr./3.5Units
43.	Course administrator's name (mention all, if more than one name)	Name: Mohammed Ghannam Mukhlif Email: mohammed.ghanam@uoanbar.edu.iq
44.	Course Objectives	
Course Objectives	This course aims to introduce the student to the groups of organic compounds, preparation methods of organic compounds and their reactions moreover their nomenclature, the second course includes aromatic compound (benzene), its nomenclature, its reactions and aromatic characteristic	
45.	Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none"> • Enable the student to obtain theoretical scientific knowledge of organic chemistry. • Introducing the student to methods of preparing chemical compounds. • The student's understanding of how chemical reactions occur. • The student is proficient in conducting experiments and using equipment efficiently. • The student must master the nomenclature of organic compounds. • Distinguish between alkane, alkene, alkyne and aromatic compounds. • Study the role of functional groups and their role in reactions. 	

46. Course Structure

The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	2 theoretical + 2 practical	Elements and compounds, the electronic Configuration	General introduction	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	2 theoretical + 2 practical	The Covalent bond, Polarity of Molecules, Acids and bases	General introduction	Lecture + laboratory	Weekly and monthly exams
3	2 theoretical + 2 practical	Interaction and their types, Resonance	General introduction	Lecture + laboratory	And laboratory reports
4	2 theoretical + 2 practical	Forces between molecules and hydrogen bonds	General introduction	Lecture + laboratory	Weekly and monthly exams
5	2 theoretical + 2 practical	Properties of alkanes and their industrial sources	Alkanes	Lecture + laboratory	And laboratory reports
6	2 theoretical + 2 practical	Specific rotation (methanebutane)	Alkanes	Lecture + laboratory	Weekly and monthly exams
7	2 theoretical + 2 practical	Systems structural formula, nomenclature of alkanes	Alkanes	Lecture + laboratory	And laboratory reports
8	2 theoretical + 2 practical	Preparation alkanes and their reactions	Alkanes	Lecture + laboratory	Weekly and monthly exams
9	2 theoretical + 2 practical	Chain reaction, Analysis of alkanes	Alkanes	Lecture + laboratory	And laboratory reports
10	2 theoretical + 2 practical	Physical properties ,nomenclature of alicyclic compounds	CycloAlkanes	Lecture + laboratory	Weekly and monthly exams
11	2 theoretical + 2 practical	Properties of alicyclic compounds- Reaction of alicyclic compounds and their conformation	CycloAlkanes	Lecture + laboratory	And laboratory reports
12	2 theoretical + 2 practical	Nomenclature of alkenes- Physical properties of alkenes, π orbital	Alkanes	Lecture + laboratory	Weekly and monthly exams

13	1 theoretical + 2 practical	Properties of alkenes - Reaction of alkenes	Alkanes	Lecture + laboratory	And laboratory reports
14	1 theoretical + 2 practical	Dienes, their nomenclature, their reaction, their preparation	Alkanes	Lecture + laboratory	Weekly and monthly exams
15	1 theoretical + 2 practical	Alkynes, structure of acetylene, their properties, their, acidity of alkynes	Alkanes	Lecture + laboratory	And laboratory reports

47. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

48. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry, L . G . WA D E , J R . Organic Chemistry R.T. Morrison and R. N. Boyd's
Main references (sources)	Organic chemistry Francis Carey
Recommended books and references (scientific journals, reports...)	Eighth Edition, 2013, Pearson Education, Inc. in the United States of America.
Electronic References, Websites	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions

Course Description Form

49.	Course Name:					
	Organic Chemistry					
50.	Course Code:					
	CHEM223					
51.	Semester / Year:					
	First semester/2023-2024					
52.	Description Preparation Date:					
	٢٠٢٣/10/01					
53.	Available Attendance Forms:					
	Daily, at the time specified in the schedule, and at full time					
54.	Number of Credit Hours (Total) / Number of Units (Total)					
	60 hr./5.5 Units					
55.	Course administrator's name (mention all, if more than one name)					
	Name: Assistant Professor Dr. Ali Sami Ismail Email: esp.ali.sami@uoanbar.edu.iq					
56.	Course Objectives					
	Course Objectives	This course aims to introduce the student to the organic compounds of alcohols, phenols, ethers of aryl halides, ketones, aldehydes, carboxylic acids, amines, and sulfur-phosphorus compounds in terms of their properties, nomenclature, interactions, ways to benefit from them, and their applications in life.				
57.	Teaching and Learning Strategies					
	Strategy	Enable the student to obtain theoretical scientific knowledge of organic chemistry. Introducing the student to methods of preparing chemical compounds. The student understands how chemical reactions occur through reaction mechanics.				
58.	Course Structure					
	Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4 hrs. Theoretical	Alcohols	<u>Alcohols</u> Nomenclature, classification, physical properties, alcohols sources mono hydroxyl alcohols, poly hydroxyl alcohols, preparation of mono hydroxyl alcohols, reaction of alcohols.	Lecture + laboratory	Monthly exams
2	4 hrs. Theoretical	Alcohols	<u>Alcohols</u> Nomenclature, classification, physical properties, alcohols sources mono hydroxyl alcohols, poly hydroxyl alcohols, preparation of mono hydroxyl alcohols, reaction of alcohols.	Lecture + laboratory	Monthly exams
3	4 hrs. Theoretical	Phenols	<u>Phenols</u> General formula and structure, physical properties, phenols sources, preparation of phenolic compounds, reaction of phenols.	Lecture + laboratory	Monthly exams
4	4 hrs. Theoretical	Ether and Epoxides	<u>Ether and Epoxides</u> Nomenclature, physical properties, preparation of ethers, preparation of epoxides, reaction of ether, reaction of epoxides.	Lecture + laboratory	Monthly exams
5	4 hrs. Theoretical	Aldehydes and ketones	<u>Aldehydes and ketones</u> Structure, physical properties of aldehydes and ketones, preparation of aldehydes and ketones, reaction of aldehydes and ketones, nucleophilic addition to the carbonyl group (double bond), classification of carbonyl derivatives, acidity of α -hydrogen, condensation reaction of aldehydes and	Lecture + laboratory	Monthly exams

			ketones and their mechanisms.		
6	4 hrs. Theoretical		<u>Aldehydes and ketones</u> Structure, physical properties of aldehydes and ketones, preparation of aldehydes and ketones, reaction of aldehydes and ketones, nucleophilic addition to the carbonyl group (double bond), classification of carbonyl derivatives, acidity of α -hydrogen, condensation reaction of aldehydes and ketones and their mechanisms.	Lecture + laboratory	Monthly exams
v	4 hrs. Theoretical	Carboxylic acids	<u>Carboxylic acids</u> Carboxylic acids structures, physical properties, nomenclature, carboxylic acid salts, carboxylic acid sources, preparation of carboxylic acids, reaction of carboxylic acids, dicarboxylic acids.	Lecture + laboratory	Monthly exams
^	4 hrs. Theoretical	Carboxylic acids	<u>Carboxylic acids</u> Carboxylic acids structures, physical properties, nomenclature, carboxylic acid salts, carboxylic acid sources, preparation of carboxylic acids, reaction of carboxylic acids, dicarboxylic acids.	Lecture + laboratory	Monthly exams
9	4 hrs. Theoretical	Carboxylic acids derivatives	<u>Carboxylic acids derivatives</u> Structure carboxylic acids derivatives (general structure), types of carboxylic	Lecture + laboratory	Monthly exams

			acids derivatives, nomenclature, physical properties, preparation of carboxylic acids derivatives, reaction of carboxylic acids derivatives.		
10	4 hrs. Theoretical	Carboxylic acids derivatives	<u>Carboxylic acids derivatives</u> Structure carboxylic acids derivatives (general structure), types of carboxylic acids derivatives, nomenclature, physical properties, preparation of carboxylic acids derivatives, reaction of carboxylic acids derivatives.	Lecture + laboratory	Monthly exams
11	4 hrs. Theoretical	Amines and diazonium salts	<u>Amines and diazonium salts:</u> General structure, types of amines, nomenclature, physical properties, amines salts, amines sources, preparation of amines, basicity of amines, reaction of amines (substitution reaction), reaction of amines with acid, diazonium salts formation, coupling reaction amines and diazonium salts.	Lecture + laboratory	Monthly exams
12	4 hrs. Theoretical	Amines and diazonium salts	<u>Amines and diazonium salts:</u> General structure, types of amines, nomenclature, physical properties, amines salts, amines sources, preparation of amines, basicity of amines, reaction of amines (substitution reaction), reaction of amines with acid, diazonium salts formation, coupling reaction amines and	Lecture + laboratory	Monthly exams

			diazonium salts.		
۱۳	4 hrs. Theoretical	Aryl halides	<u>Aryl halides</u> General formula and structure, physical properties, preparation of aryl halides, reaction of aryl halides.	Lecture + laboratory	Monthly exams
۱۴	4 hrs. Theoretical	Organosulfur compounds	<u>Organosulfur compounds</u> General formula and structure, physical properties, methods of preparation of organosulfur compounds, reaction of organosulfur compounds, sulphonic properties.	Lecture + laboratory	Monthly exams
۱۵	4 hrs. Theoretical	Organophosphorus compounds	<u>Organophosphorus compounds</u> Types of organophosphorus compounds, methods of preparation, types of reactions.	Lecture + laboratory	Monthly exams

59. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

60. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ul style="list-style-type: none"> ▪ Organic Chemistry, L. G. Wade, J R. Eighth Edition, 2013, Pearson Education, Inc. in the United States of America. ▪ Organic Chemistry 7th Edition, 2013 by Robert Thornton Morrison, Robert Neilson Boyd, Saibal Kanti Bhattacharjee, Publisher: Pearson Education
Main references (sources)	Organic Chemistry, 8th Ed, 2012 by John McMurry, Brooks/Cole Publisher.
Recommended books and references (scientific journals, reports...)	The Organometallic Chemistry of the Transition Metals, Robert H. Crabtree, 2014.
Electronic References, Websites	

Course Description Form

1. Course Name:					
Analytical chemistry					
2. Course Code:					
CHEM213					
3. Semester / Year:					
Second semester/2023-2024					
4. Description Preparation Date:					
14/3/2024					
5. Available Attendance Forms:					
Daily, at the time specified in the schedule, and at full time					
6. Number of Credit Hours (Total) / Number of Units (Total)					
90hr./5.5Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Ahmed Dhary Saleh Email: eps.ahmeddhari.saleh@uoanbar.edu.iq					
8. Course Objectives					
Course Objectives		This course aims to teach the student what is the meaning of analytical chemistry. what are its advantages, precipitation analysis. The study the steps of precipitation analysis and the types of precipitants, as well as chemical separation methods.			
9. Teaching and Learning Strategies					
Strategy		1. Adopting the method of dialogue between the student and the professor 2-Preparing organized reports 3-Adopting the discussion method.			
10. Course Structure					
The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	4 theoretical + 3 practical	Introduction to analytical chemistry and gravimetric analysis	Analytical chemistry / mainly studies the determination of the chemical composition of substances or compounds and determining their	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	4 theoretical + 3 practical	Types of gravimetric methods	Volatilization methods, isolation methods, and deposition methods. And types of organic and inorganic precipitants	Lecture + laboratory	Weekly and monthly exams
3	4 theoretical + 3 practical	Composition of the precipitate and calculations in quantitative gravimetric analysis	Gravimetric analysis depends on measuring the weight of a substance with a known composition that has a chemical	Lecture + laboratory	And laboratory reports

			relationship with the analyte		
4	4 theoretical + 3 practical	Solubility of the precipitate and factors affecting solubility	The solubility product of a poorly soluble salt (its solubility is less than 0.01 mol/L) is defined as the product of the molar concentration of the ions in the solution raised to the power of the number of ions involved in the chemical balance equation	Lecture + laboratory	Weekly and monthly exams
5	4 theoretical + 3 practical	Crystalline formation of the sediment	The crystal formation and particle size of the precipitate are among the basic characteristics of the precipitate in quantitative gravimetric analysis	Lecture + laboratory	And laboratory reports
6	4 theoretical + 3 practical	Colloidal solutions and types of colloidal precipitates	Colloidal solution - is the solution in which the precipitate particles remain suspended in the solution and do not agglomerate due to gravity	Lecture + laboratory	Weekly and monthly exams
7	4 theoretical + 3 practical	Precipitate contamination and its types	The precipitation process often leads to obtaining sediments that are contaminated to some degree	Lecture + laboratory	And laboratory reports
8	4 theoretical + 3 practical	Methods of treating pollution	Adding of the precipitating agent slowly with stirring, precipitate from hot solutions, choose the appropriate acid buffer for precipitation, and digest the precipitate	Lecture + laboratory	Weekly and monthly exams
9	4 theoretical + 3 practical	Washing solutions	Types of washing solutions and conditions that must be met in the washing solution	Lecture + laboratory	And laboratory reports
10	4 theoretical + 3 practical	Sedimentation in homogeneous solutions	Types of homogeneous sedimentation, its advantages	Lecture + laboratory	Weekly and monthly exams
11	4 theoretical + 3 practical	Indirect separation techniques	The process of separating two or more components in a specific mixture will require researching the physical or chemical properties	Lecture + laboratory	And laboratory reports
12	4 theoretical + 3 practical	Precipitation separation methods	Precipitation separation methods depend mainly on the creation of a new, usually solid, phase as a result of a chemical reaction	Lecture + laboratory	Weekly and monthly exams
13	4 theoretical + 3 practical	Distillation and volatilization methods	Distillation is a direct separation method that does not require the addition of a new auxiliary phase. The new phase is created	Lecture + laboratory	And laboratory reports

			due to physical methods		
14	4 theoretical + 3 practical	Solvent extraction	Liquid-liquid extraction processes depend on the distribution of solute molecules between two liquid phases	Lecture + laboratory	Weekly and monthly exams
15	4 theoretical + 3 practical	Chromatography	Chromatographic separation methods and types	Lecture + laboratory	And laboratory reports

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	General foundations of chemical gravimetric analysis, Part One, Dr. Safaa Razouqi Al-Murayb, University of Baghdad
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

13. Course Name:					
Computers					
14. Course Code:					
2 nd stage					
15. Semester / Year:					
Courses - semester					
16. Description Preparation Date:					
2 – 4 – 2024					
17. Available Attendance Forms:					
Daily, at the time specified in the schedule, and at full time					
18. Number of Credit Hours (Total) / Number of Units (Total)					
4 hours					
19. Course administrator's name (mention all, if more than one name)					
Name: Rafid Sayhood Abdulaziz					
Email: rafid.alhashimy@uoanbar.edu.iq					
20. Course Objectives					
Course Objectives		<ul style="list-style-type: none"> • Teaching the student how to use and manage the computer and its programs and applications • help the student complete projects, print, create presentations • have full knowledge of using the Internet due to the need for it in many fields, including education, marketing, and electronic correspondence 			
21. Teaching and Learning Strategies					
Strategy		<p>The student's knowledge of the parts of a computer, its accessories, and ways to use it.</p> <p>The student's ability to apply what he has learned on the computer in laboratory.</p>			
22. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	4 Theoretical	Introductory introduction - Microsoft Word	Microsoft Word basics	lecture	Monthly exams
٢	4 Theoretical	Knowledge of the tools for File	Components of Microsoft Word	lecture	Monthly exams
٣	4 Theoretical	Change the appearance of text	Components of Microsoft Word	lecture	Monthly exams
٤	4 Theoretical	Set the default working folder	Components of Microsoft Word	lecture	Monthly exams

٥	4 Theoretical	Spelling and grammar checker	Components of Microsoft Word	lecture	Monthly exams
٦	4 Theoretical	Digital census	Components of Microsoft Word	lecture	Monthly exams
٧	4 Theoretical	Paragraph spacing	Components of Microsoft Word	lecture	Monthly exams
٨	4 Theoretical	Insert pieces into a sheet	Components of Microsoft Word	lecture	Monthly exams
٩	4 Theoretical	Insert an image from the computer	Components of Microsoft Word	lecture	Monthly exams
١٠	4 Theoretical	Insert charts	Components of Microsoft Word	lecture	Monthly exams
١١	4 Theoretical	Insert signature line	Components of Microsoft Word	lecture	Monthly exams
١٢	4 Theoretical	page Setup	Components of Microsoft Word	lecture	Monthly exams
١٣	4 Theoretical	C++ programming language	Introduction to programming language	lecture	Monthly exams
١٤	4 Theoretical	Learn the C++ programming language	How to learn programming language	lecture	Monthly exams
١٥	4 Theoretical	Basic rules in the C++ programming language	Learn the basic rules of the programming language	lecture	Monthly exams

23. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Computer basics and office applications - Ministry of Comprehensive Scientific Education / Advanced Research Department.
Main references (sources)	- Learn ((Microsoft Word 2016) Muhammad Malik Muhammad, 2018. - A complete guide to programming in C++, Jones and Bartlett publishers
Recommended books and references (scientific journals, reports...)	C++ Language Tutorial.
Electronic References, Websites	https://www.programiz.com/cpp-programming

Course Description Form

1. Course Name:	
organic chemistry1	
2. Course Code:	
Chem 303	
3. Semester / Year:	
first semester/2023-2024	
4. Description Preparation Date:	
1/9/2023	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75hr./3.5Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof.Dr. Ahmed Hamed Shukkur Email: ahmedsatori@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce the student to the acidity and basicity of organic compounds, the types of effective intermediates in terms of their stereoscopic shape, their stability factors, methods of obtaining them and their interactions, the concept of stereochemistry, chiral atoms and stereoisomers, nucleophilic substitution reactions at a saturated carbon atom and deletion reactions, the concept of polycyclic aromatic compounds, their naming and reactions. And ways to obtain them, the concept of heterocyclic compounds in terms of their properties, names, interactions, ways to benefit from them, and their applications in life.
9. Teaching and Learning Strategies	
Strategy	<p>a. Cognitive objectives</p> <ol style="list-style-type: none"> 1. Enable the student to obtain theoretical scientific knowledge of organic chemistry. 2. Introducing the student to methods of preparing chemical compounds. 3. The student's understanding of how chemical reactions occur through reaction mechanics. <p>B. Course-specific skills objectives</p> <ol style="list-style-type: none"> 1. The student is proficient in conducting experiments and using equipment efficiently. 2. The student must master the nomenclature of organic compounds. 3. Distinguish between nucleophilic and electrophilic attack. 4. Study the role of functional groups and their role in interaction

10. Course Structure

The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	2 theoretical + 2 practical	Acids	Acids Factors affecting the origin of acidity	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	2 theoretical + 2 practical	Acids	Simple aliphatic Acids	Lecture + laboratory	Weekly and monthly exams
3	2 theoretical + 2 practical	Acids	Substituent aliphatic Acids	Lecture + laboratory	And laboratory reports
4	2 theoretical + 2 practical	Acids	Phenols and Substituent Phenols	Lecture + laboratory	Weekly and monthly exams
5	2 theoretical + 2 practical	Acids	Aromatic acids and Substituent Aromatic acids	Lecture + laboratory	And laboratory reports
6	2 theoretical + 2 practical	Bases	Simple aliphatic bases	Lecture + laboratory	Weekly and monthly exams
7	2 theoretical + 2 practical	Bases	Substituent aliphatic bases	Lecture + laboratory	And laboratory reports
8	2 theoretical + 2 practical	Bases	Aromatic bases	Lecture + laboratory	Weekly and monthly exams
9	2 theoretical + 2 practical	Bases	Heterocyclic bases	Lecture + laboratory	And laboratory reports
10	2 theoretical + 2 practical	Carbonium ion	Reactive organic intermediates Carbonium ion, methods of preparation,	Lecture + laboratory	Weekly and monthly exams

			stability factors		
11	∇ theoretical + 2 practical	Carbonium ion	Reactions of Carbonium	Lecture + laboratory	And laboratory reports
12	∇ theoretical + 2 practical	Carbanion	methods of preparation, stability factors	Lecture + laboratory	Weekly and monthly exams
13	∇ theoretical + 2 practical	Carbanion	Reactions of Carbanion	Lecture + laboratory	And laboratory reports
14	∇ theoretical + 2 practical	Carbene and nitrene	Carbene and nitrene Methods of their preparation, stability factors it reactions	Lecture + laboratory	Weekly and monthly exams
15	∇ theoretical + 2 practical	Free radical	Free radical Preparation methods, stability it reactions	Lecture + laboratory	And laboratory reports

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry Graham Solomon / USA
Main references (sources)	Organic chemistry Francis Carey
Recommended books and references (scientific journals, reports...)	Advanced Organic Chemistry Jerry March / USA
Electronic References, Websites	Organic Chemistry Graham Solomon/ USA

Course Description Form

1. Course Name:	
organic chemistry ٦	
2. Course Code:	
Chem 3٢٦	
3. Semester / Year:	
first semester/2023-2024	
4. Description Preparation Date:	
1/2/2024	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75hr./3.5Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Mohammed Ghannam ukhlif Email: mohammed.ghanam@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce the student to the acidity and basicity of organic compounds, the types of effective intermediates in terms of their stereoscopic shape, their stability factors, methods of obtaining them and their interactions, the concept of stereochemistry, chiral atoms and stereoisomers, nucleophilic substitution reactions at a saturated carbon atom and deletion reactions, the concept of polycyclic aromatic compounds, their naming and reactions. And ways to obtain them, the concept of heterocyclic compounds in terms of their properties, names, interactions, ways to benefit from them, and their applications in life.
9. Teaching and Learning Strategies	
Strategy	<p>a. Cognitive objectives</p> <ol style="list-style-type: none"> 1. Enable the student to obtain theoretical scientific knowledge of organic chemistry. 2. Introducing the student to methods of preparing chemical compounds. 3. The student's understanding of how chemical reactions occur through reaction mechanics. <p>B. Course-specific skills objectives</p> <ol style="list-style-type: none"> 1. The student is proficient in conducting experiments and using equipment efficiently. 2. The student must master the nomenclature of organic compounds. 3. Distinguish between nucleophilic and electrophilic attack. 4. Study the role of functional groups and their role in interaction

10. Course Structure

The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	2 theoretical + 2 practical	Reactive intermediates	Rearrangements reactions on deficient electron carbon, nitrogen and oxygen atoms	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	2 theoretical + 2 practical	Reactive intermediates	Rearrangements reactions on rich electron carbon	Lecture + laboratory	Weekly and monthly exams
3	2 theoretical + 2 practical	Benzyne	Benzyne intermediate Methods of its preparation and interactions	Lecture + laboratory	And laboratory reports
4	2 theoretical + 2 practical	Stereochemistry	Stereochemistry Chiral carbon Naming atom spatial shapes according to the system (R, S)	Lecture + laboratory	Weekly and monthly exams
5	2 theoretical + 2 practical	Reactions of chiral molecules	Interactions of chiral molecules	Lecture + laboratory	And laboratory reports
6	2 theoretical + 2 practical	Nucleophilic substitution on a saturated carbon atom	Nucleophilic substitution on a saturated carbon atom SN2, SN1 mechanics	Lecture + laboratory	Weekly and monthly exams
7	2 theoretical + 2 practical	Nucleophilic substitution on a saturated carbon atom.	The effect of structure and solvent leaving group on the mechanism of SN2 and SN1	Lecture + laboratory	And laboratory reports
8	2 theoretical + 2 practical	Nucleophilic substitution on a saturated carbon atom.	Reactions include the mechanism of SN2 and SN1	Lecture + laboratory	Weekly and monthly exams
9	2	Elimination reactions	Elimination	Lecture +	And

	theoretical + 2 practical		mechanism E2, E1	laboratory	laboratory reports
10	∇ theoretical + 2 practical	Elimination reactions	Orientation in E according to Saytsov and Hoffman	Lecture + laboratory	Weekly and monthly exams
11	∇ theoretical + 2 practical	Polycyclic aromatic compounds	Nomenclature of Polycyclic aromatic compounds	Lecture + laboratory	And laboratory reports
12	∇ theoretical + 2 practical	Polycyclic aromatic compounds	Methods of obtaining them and their interactions	Lecture + laboratory	Weekly and monthly exams
13	∇ theoretical + 2 practical	Heterocyclic compounds	Heterocyclic compounds Its types, names and physical properties	Lecture + laboratory	And laboratory reports
14	∇ theoretical + 2 practical	Heterocyclic compounds	Methods of obtaining them and their interactions	Lecture + laboratory	Weekly and monthly exams
15	∇ theoretical + 2 practical	Heterocyclic compounds	Five and six- membered generation Methods and their interactions	Lecture + laboratory	And laboratory reports

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry Graham Solomon / USA
Main references (sources)	Organic chemistry Francis Carey
Recommended books and references (scientific journals, reports...)	Advanced Organic Chemistry Jerry March / USA
Electronic References, Websites	Organic Chemistry Graham Solomon/ USA

Course Description Form

1. Course Name:	
Identification organic	
2. Course Code:	
stage four	
3. Semester / Year:	
Courses - first semester	
4. Description Preparation Date:	
2024 / 4 / 2	
5. Available Attendance Forms:	
Daily and at the time specified in the schedule	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours (2 theoretical + 3 practical)	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Nabeel Yassin Jumaa	
Email: dr.j.t.2012@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	Classic methades for spectroscopy Modern methods of spectroscopy
9. Teaching and Learning Strategies	
Strategy	١ . Lectures ٢ . Using educational programs to give the lecture through one program and explain it to students through another program.
١٠ . Course structure	

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	hours	the week
Weekly and monthly exams And laboratory reports	Lecture + laboratory	<p>- the introduction</p> <p>- Mechanical absorption of infrared radiation</p> <p>Types of vibrations in organic molecules</p> <p>- Device parts</p> <p>- Sample preparation</p> <p>Important notes and rules about the IR spectrum and the factors affecting the location of the beams, including:</p> <p>(Aromatic compounds, aliphatic compounds, alkanes, alkenes, alkynes, alcohols and phenols, amines, ethers, carbonyl compounds, sulfonyl compounds, mercaptans, nitriles, aromatic systems)</p> <p>- Effective groups and their locations in the IR spectrum</p> <p>- Applications of IR in the diagnosis of organic compounds</p> <p>- Issues in IR spectrum</p>	Infrared spectroscopy (I.R)	7 theoretical + 3 practical	0 - 1

^ Course structure (continuation)

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	hours	the week
<p>Weekly and monthly exams</p> <p>And laboratory reports</p>	Lecture + laboratory	<p>1-¹H-NMR</p> <ul style="list-style-type: none"> - the introduction - Device parts - Sample preparation <p>How does nuclear resonance occur?</p> <ul style="list-style-type: none"> - Blocking and non-blocking - Chemical displacement - Measurements of the signal location in the ¹H-NMR spectrum - Important notes on ¹H-NMR spectroscopy - Benefits and conclusions from signals in the ¹H-NMR spectrum - Splitting of resonance signals and its causes - Aromatic systems - Chemical displacement locations of protons in the ¹H-NMR spectrum - Applications of (¹H-NMR) in the diagnosis of organic compounds - Issues in ¹H-NMR spectrum 	Nuclear magnetic resonance (NMR) spectroscopy	<p>2 theoretical</p> <p>+ 3 practical</p>	1 - 6

Course structure (continuation)						
Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	hours	the week	
Weekly and monthly exams And laboratory reports	Lecture + laboratory	^{13}C -NMR -the introduction -Important notes in the ^{13}C -NMR spectrum -Chemical displacement sites of some ^{13}C atoms -Examples of ^{13}C -NMR spectrum -Issues in ^{13}C -NMR spectrum	Nuclear magnetic resonance (NMR) spectroscopy	2 theoretical + 3 practical	11	
Weekly and monthly exams And laboratory reports	Lecture + laboratory	- the introduction - Benefits and conclusions of using the UV spectrum in diagnosing organic compounds - Device parts - Mechanism of absorption of ultraviolet radiation by organic molecules - Important terms in the UV spectrum - Factors affecting the positions of the beams in the ultraviolet spectrum (oxochrome, hydrogen bonding, sequence, steric obstruction) - Benzene, its derivatives, and other aromatic compounds	Ultraviolet spectroscopy (UV)	2 theoretical + 3 practical	13 - 14	

			- Interpretation of ultraviolet spectra.			
Weekly and monthly exams And laboratory reports	Lecture + laboratory		- the introduction - Device parts - Initialize the form - Conclusions from the mass spectrum - The general shape of the mass spectrum - Applications and examples of mass spectrum in diagnosing organic compounds * Issues in the spectroscopic diagnosis of organic compounds	Mass spectrometry (MS)	2 theoretical + 3 practical	10 - 14

11. Course Evaluation

Course Assessments	Term Tests	Laboratory	Quizzes	project	Final Exam
	% 15	% 15	% 10		% 60

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1 – Spectrometric Identification Of Organic Compounds , Seventh Edition , Robert M. Silverstein , New York , 2005 2 - Organic Chemistry , Third Edition , Janice Gorzynski Smith , New York , 2011
Main references (sources)	Absorption spectra of organic molecules, translated by: Prof. Dr. Abdul Hussein Khudair Abbas Al Sharba, Jassim Muhammad Ali Al-Rawi, Muhammad Ahmed Al-Iraqi, University of Mosul, 1985.
Recommended books and references (scientific journals, reports...)	Identification organic and spectroscopy
Electronic References, Websites	Identification of organic compounds

Course Description Form

13. Course Name:					
Biochemistry/ forth stage					
14. Course Code:					
CHEM 452 and 453					
15. Semester / Year:					
yearly					
16. Description Preparation Date:					
3/4/2024					
17. Available Attendance Forms:					
My attendance weekly					
18. Number of Credit Hours (Total) / Number of Units (Total)					
Four hours/3 units					
19. Course administrator's name (mention all, if more than one name)					
Name: Shakir Faris Tuleab Email: esp.shaker.faris@uoanbar.edu.iq					
20. Course Objectives					
Course Objectives	This course aims to introduce the student to large biomolecules and their metabolic processes, the relationship between the various metabolic pathways and the energy we need to build a known biomolecule, the amount of energy resulting from the process of bio catabolism of known biomolecules, and identify the enzymes that regulate these processes and the mechanism of action of these enzymes.				
21. Teaching and Learning Strategies					
Strategy	1- Adopting the latest modern scientific research in determining the mechanism of action of enzymes 2. The student's knowledge of modern methods in the biosynthesis of . biomolecules. 3. Knowing the small structural and structural units that form the structure of large biomolecules. 4. Providing the student with modern information about energy . calculations through research				
22. Course Structure					
Evaluation method	Teaching method	Name of unit/course or subject	Required learning outcomes	Hours	weeks
Oral and monthly exams	Lecture	Advanced biochemistry	BIOENERGETICS	2 Theoretical	1
	Lecture			2 Theoretical	2

Oral and monthly exams	Lecture	Biochemistry/1	High energy compounds	2 Theoretical	3	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	4	
Oral and monthly exams	Lecture	Biochemistry/1	Krebs cycle, pentose sugar pathway, electron transport chain, oxidative phosphorylation, and energy calculations	2 Theoretical	5	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	6	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	7	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	8	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	9	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	10	
Oral and monthly exams	Lecture	Biochemistry/1		2 Theoretical	11	
Oral and monthly exams	Lecture	Biochemistry/1		Fats, their classification mechanisms, the biological importance of fats, beta oxidation of fats, fat biosynthesis, cholesterol synthesis, ketone bodies, and energy calculations.	2 Theoretical	12
Oral and monthly exams	Lecture	Biochemistry/1			2 Theoretical	13
Oral and monthly exams	Lecture	Biochemistry/1	2 Theoretical		14	
Oral and monthly exams	Lecture	Biochemistry/1	2 Theoretical		15	
Oral and monthly exams	Lecture	Biochemistry/2	2 Theoretical		1	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	2	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	3	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	4	
Oral and monthly exams	Lecture	Biochemistry/2	Proteins, their classification mechanisms, the biological importance of proteins, amino acid metabolism, urea metabolism, creatine and creatinine metabolism, and the relationship between the metabolic pathways of amino acids.	2 Theoretical	5	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	6	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	7	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	8	
Oral and monthly exams	Lecture	Biochemistry/2	Nucleic acids, their classification mechanisms, and the biological importance of nucleic acids	2 Theoretical	9	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	10	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	11	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	12	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	13	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	14	
Oral and monthly exams	Lecture	Biochemistry/2		2 Theoretical	15	

23. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Lehninger Principles of Biochemistry by David L. Nelson 2- Biochemistry: Concepts and Connections by Dean Appling 3- Clinical Chemistry: Principles, Techniques correlations by Michael L. Bishop
Main references (sources)	<ul style="list-style-type: none"> ❖ Lehninger Principles of Biochemistry. ❖ Textbook of Biochemistry with Clinical Correlations. ❖ Marks' Basic Medical Biochemistry. ❖ Color Atlas of Biochemistry.
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <input type="checkbox"/> Molecular Cancer. <input type="checkbox"/> Annual Review of Biochemistry. <input type="checkbox"/> Signal Transduction and Targeted Therapy. <input type="checkbox"/> Molecular Cell. <input type="checkbox"/> Trends in Microbiology. <input type="checkbox"/> Nucleic Acids Research. <input type="checkbox"/> Molecular Biology and Evolution. <input type="checkbox"/> Progress in Lipid Research
Electronic References, Websites	https://www.tandfonline.com/publishoa/allife https://onlinelearning.hms.harvard.edu/biochemistry https://www.techniumscience.com/ https://www.labxchange.org/

Course Description Form

1. Course Name:					
Instrumental Analysis					
2. Course Code:					
CHEM415					
3. Semester / Year:					
First semester/2023-2024					
4. Description Preparation Date:					
12/11/2023					
5. Available Attendance Forms:					
Daily, at the time specified in the schedule, and at full time					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60hr./4 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr.Ahmed Dhary Saleh Email: eps.ahmeddhari.saleh@uoanbar.edu.iq					
8. Course Objectives					
Course Objectives		This course aims to teach the student what is the meaning of automated analysis, what are the advantages, what are the most important techniques of automated analysis, and to know components of all the devices of these techniques and how to use them in quantitative qualitative analysis.			
9. Teaching and Learning Strategies					
Strategy		The student is proficient in conducting experiments using different techniques Enable the student to work on different devices Training the student to calculate or estimate an unknown using various automated analysis technique			
10. Course Structure					
The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
١	4 theoretical	Analytical chemistry and the concept of instrumental chemical analysis	Introduction	Lecture + laboratory	Weekly and monthly exams
٢	4 theoretical	The photoelectric effect and the electromagnetic spectrum	this phenomenon is the release or emission of electrons from the surfaces of some sensitive metals when radiation with sufficient energy falls to release them	Lecture + laboratory	Weekly and monthly exams
٣	4 theoretical	Polarization of light and optical efficiency	This phenomenon is known as the optical	Lecture + laboratory	Weekly and monthly exams

			activity of the material		
4	4 theoretical	Radiation absorption and radiation emission	Absorption means the disappearance of a portion of the wave frequencies when it passes through a medium (gas, liquid, solid)	Lecture + laboratory	Weekly and monthly exams
5	4 theoretical	Quantitative analysis by absorption of electromagnetic radiation	If a radiation beam is passed through a glass container containing a solution, the light beam emerging from the container will be less than the power of the original incident beam.	Lecture + laboratory	Weekly and monthly exams
6	4 theoretical	Applications of Beer's law to multicomponent systems	Applications of Beer's law in analytical chemistry	Lecture + laboratory	
7	4 theoretical	Spectrophotometers and their components	The spectrophotometer consists of five basic components: a radiation source, a cell color combiner for setting the model, a detector, and a recorder	Lecture + laboratory	
8	4 theoretical	Applications of absorption measurements in spectroscopy in the ultraviolet and visible regions	It has little importance for the purposes of qualitative but important in Quantitative analysis	Lecture + laboratory	
9	4 theoretical	Analytical uses of absorption measurements	applications	Lecture + laboratory	
10	4 theoretical	Analysis by measuring scattering and measuring turbidity	Scattering and turbidity measurements are used to study and analyze of suspension	Lecture + laboratory	solutions
11	4 theoretical	Infrared absorption spectroscopy	Absorption of infrared radiation leads to vibrational excitation of the atoms that make up the molecule	Lecture + laboratory	
12	4 theoretical	Atomic absorption	Atomic absorption is a sophisticated analytical technique for identifying most elements	Lecture + laboratory	
13	4 theoretical	Interferometers in atomic measurement	There are a number of interferences that affect the results of analysis using the atomic	Lecture + laboratory	

			absorption technique		
14	4 theoretical	Analysis by electrochemical methods	chemistry is concerned with the study of quantitative analysis methods that are based on the electrical properties of materials	Lecture + laboratory	
15	4 theoretical	Reference electrodes are commonly used	Standard calomel electrode, silver-silver chloride electrode standard hydrogen electrode	Lecture + laboratory	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	principles of Instrumental Analysis, Skoog, Douglas West Donald M, UK.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Instrumental Analysis / Forth Stage	
2. Course Code:	
chem415	
3. Semester / Year:	
first semester/2023-2024	
4. Description Preparation Date:	
14/3/2024	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hr./°.5Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Bashar Abdulazeez Mahmood Email: bashar.abdulaziz@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	<ol style="list-style-type: none"> 1. Enabling the student to obtain theoretical scientific knowledge of automated analysis. 2. Introducing the student to methods of automated analysis. 3. The student's understanding of how to use these techniques and their applications in different areas of life with regard to quantitative and qualitative analysis
9. Teaching and Learning Strategies	
Strategy	<ol style="list-style-type: none"> 1. Adopting the method of dialogue between the student and professor 2-Preparing organized reports 3-Adopting the discussion method

10. Course Structure

The week	Hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	4 theoretical + 3 practical	Analytical chemistry and the concept of instrumental chemical analysis	Analytical chemistry is the science concerned with diagnosing the identity and composition of substances and determining their proportions.	Lecture + laboratory	Weekly and monthly exams And laboratory reports
2	4 theoretical + 3 practical	The photoelectric effect and the electromagnetic spectrum	What is meant by this phenomenon is the release or emission of electrons from the surfaces of some sensitive metals when radiation with sufficient energy falls to release them. Such as the release of electrons from the surfaces of some metals when radiation from the visible or violet region falls on them, while the electromagnetic spectrum can be divided into multiple regions according to the energy released	Lecture + laboratory	Weekly and monthly exams
3	4 theoretical + 3 practical	Polarization of light and optical efficiency	Polarization is of great importance in chemistry, as some crystals and liquids that do not have a center of symmetry (asymmetric) can rotate the plane of the polarized light that passes through them, as it undergoes rotation, either to the right (clockwise), which is called right (+ Dextrorotatory), or to the left, which is called Levorotatory, - This phenomenon is known as the optical activity of the material	Lecture + laboratory	And laboratory reports
4	4 theoretical + 3 practical	Radiation absorption and radiation emission	Absorption means the disappearance of a portion of the wave frequencies when it	Lecture + laboratory	Weekly and monthly exams

			passes through a medium (gas, liquid, solid.)		
5	4 theoretical + 3 practical	Quantitative analysis by absorption of electromagnetic radiation	If a radiation beam is passed through a glass container containing a solution, the light beam emerging from the container will be less than the power of the original incident beam.	Lecture + laboratory	And laboratory reports
6	4 theoretical + 3 practical	Applications of Beer's law to multicomponent systems	When a solution contains more than one substance that has the ability to absorb the beam. What the solution absorbs is the product of the sum of the absorption of the individual materials at a specific wavelength.	Lecture + laboratory	Weekly and monthly exams
7	4 theoretical + 3 practical	Spectrophotometers and their components	The spectrophotometer consists of five basic components: a radiation source, a cell color combiner for setting the model, a detector, and a recorder	Lecture + laboratory	And laboratory reports
8	4 theoretical + 3 practical	Applications of absorption measurements in spectroscopy in the ultraviolet and visible regions	The ultraviolet and visible regions constitute a very small area of the electromagnetic spectrum, in the range (10-780 nm). The radiation energy of these two regions has the ability to excite valence electrons in atoms or molecules, so the two regions are studied together under the name ultraviolet and visible	Lecture + laboratory	Weekly and monthly exams
9	4 theoretical + 3 practical	Analytical uses of absorption measurements	It has little importance for the purposes of qualitative but important in Quantitative analysis	Lecture + laboratory	And laboratory reports
10	4 theoretical + 3 practical	Analysis by measuring scattering and measuring turbidity	Scattering and turbidity measurements are used to study and analyze plankton	Lecture + laboratory	Weekly and monthly exams

			systems. These two methods are based on the scattering and scattering of radiation by suspended particles,		
11	4 theoretical + 3 practical	Infrared absorption spectroscopy	Absorption of infrared radiation leads to vibrational excitation of the atoms that make up the molecule. The vibrational movement of atoms relative to each other results in a change in the length of the bonds and the angles between them	Lecture + laboratory	And laboratory reports
12	4 theoretical + 3 practical	Atomic absorption	Atomic absorption is a sophisticated analytical technique for identifying most elements	Lecture + laboratory	Weekly and monthly exams
13	4 theoretical + 3 practical	Interferometers in atomic measurement	There are a number of interferences that affect the results of analysis using the atomic absorption technique, including spectral interferences, ionization interferences, and chemical interferences.	Lecture + laboratory	Weekly and monthly exams
14	4 theoretical + 3 practical	Analysis by electrochemical methods	Electroanalytical chemistry is concerned with the study of quantitative analysis methods that are based on the electrical properties of materials (elements or compounds) when they are part of an electrochemical cell	Lecture + laboratory	Weekly and monthly exams
15	4 theoretical + 3 practical	Reference electrodes are commonly used	Standard calomel electrode, silver-silver chloride electrode, standard hydrogen electrode	Lecture + laboratory	Weekly and monthly exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Instrumental chemical analysis, Dr. Ab Mohsen Al-Haidari
Main references (sources)	Instrumental chemical analysis, Dr. Fa Jassim principles of Instrumental Analysis, Skoc Douglas A. West Donald M, UK
Recommended books and references (scientific journals, reports...)	CATHERINE E. HOUSECROFT AND ALAN SHARPE INORGANIC CHEMISTRY
Electronic References, Websites	https://www.labxchange.org/topic/chemistry- middle-chemical-reactions

Course Description Form

1. Course Name:	
Chemical calculations 4	
2. Course Code:	
3. Semester / Year:	
Second semester/2023-2024	
4. Description Preparation Date:	
2023-2024	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30hr./ 2 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Muthana Mohammed Sirhan Email: muth_974na@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	1- Emphasizing the importance of calculations used in general chemistry 2- That students become familiar with the most important chemical calculations 3- Identify all types of units for expressing quantities and calculating unknown concentrations 4- Calculating chemical constants, acid function, and methods of preparing solutions.
9. Teaching and Learning Strategies	
Strategy	1- That the student understands what is meant by accounts 2- For the student to distinguish between the types of expression for calculations in general and analytical chemistry 3- For the student to recognize the relationship between different chemical concentrations 4- That the student becomes familiar with the types of how to use this general and analytical chemistry

10. Course Structure					
The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	2 theoretical	Learn about the concept of moles, how to calculate them, percentages, and how to find compounds	The concept of moles and percentage calculations of compounds	Lecture	Weekly and monthly exams
2	2 theoretical	Chemical formula types	Chemical formula types	Lecture	Weekly and monthly exams
3	2 theoretical	Learn how to balance chemical equations	Chemical equation and calculation of the amount of reactant and product	Lecture	Weekly and monthly exams
4	2 theoretical	Learn how to find the limiting factor for a reaction, determine how to calculate it, and find the percentage of the product	The limiting factor, percentage yield, and how to calculate them	Lecture	Weekly and monthly exams
5	2 theoretical	Learn about the concept of titration and how to use it to titrate acids and bases	Basic calculations and calibration calculation	Lecture	Weekly and monthly exams
6	2 theoretical	Identify how precipitations occurs in different media and find equations for precipitations	Calculations related to precipitations equations	Lecture	Weekly and monthly exams
7	2 theoretical	Identify solute and solvent, their types, and how to calculate their	Solutions, their types, and how to prepare	Lecture	Weekly and monthly

		quantities in solutions	them		exams
8	✓ theoretical	Know the types of expressions for concentration and how to find the concentration of a component	Basic concepts in calculating concentration	Lecture	Weekly and monthly exams
9	✓ theoretical	The ability to solve questions and examples related to calculating concentration	Mathematical examples to understand the preparation of solutions	Lecture	Weekly and monthly exams
10	✓ theoretical	Identify the standard solution of substances, especially acids, bases, and salts	Preparing standard solutions.	Lecture	Weekly and monthly exams
11	✓ theoretical	Know the basic concepts of expressing concentrations in solutions.	The relationship between methods of expressing physical and chemical concentration.	Lecture	Weekly and monthly exams
12	✓ theoretical	Calculating the concentrations of solutions using the physical method and how to use the law of calculation	Prepare standard solutions in parts per million	Lecture	Weekly and monthly exams
13	✓ theoretical	Knowing chemical equilibrium and calculating the equilibrium constant	The law of chemical equilibrium and how to calculate it	Lecture	Weekly and monthly exams
14	✓ theoretical	Learn about Buffer	Buffer	Lecture	Weekly

		solutions and how to prepare them from acids and salts	solutions and how to prepare them		and monthly exams
15	γ theoretical	Calculating the pH function, Buffer solutions and their types	The pH function, Buffer solutions, and how to calculate them	Lecture	Weekly and monthly exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Analytical Chemistry -Fundamentals of Analytical Chemistry- Douglas A. Skoog- 8 edition – USA 2- Questions and tests in chemistry Dr. Jameel muse Dbal 3- Analytical chemistry, volumetric and gravimetric analy Dr. Ibrahim Al-Zami
Recommended books and references (scientific journals, reports...)	4- CATHERINE E. HOUSECROFT AND ALAN G. SHARPE INORGANIC CHEMISTRY
Electronic References, Websites	https://www.labxchange.org/topic/chemistry-middle-chemical-reactions

Course Description Form

25.	Course Name:	Industrial Chemistry
26.	Course Code:	CHEM463
27.	Semester / Year:	Second semester/2023-2024
28.	Description Preparation Date:	٢٠٢٣/١١/١٢
29.	Available Attendance Forms:	Daily, at the time specified in the schedule, and at full time
30.	Number of Credit Hours (Total) / Number of Units (Total)	60 hr./4 5Units
31.	Course administrator's name (mention all, if more than one name)	
	Name:	Assistant Professor Dr. Ali Sami Ismail
	Email:	esp.ali.sami@uoanbar.edu.iq
32.	Course Objectives	
	Course Objectives	<ul style="list-style-type: none"> ▪ This course aims to introduce the student to the importance of the petrochemical industries, which are part of the national wealth, and to identify the derivatives and compounds that these industries produce. ▪ It also introduces the student to the manufacturing industries to obtain various products, starting from textiles, plastics, and rubber. ▪ It also introduces the student to other industries.
33.	Teaching and Learning Strategies	
	Strategy	Explain to the student the importance of Industrial Chemistry in our daily lives. And characterize the main processes in the petrochemical industries. Then conducts practical experiments related to petroleum chemistry, catalyst preparation, catalytic reactions, and hydrocarbon analyses. Also explains problems associated with the petrochemical

industry and provides solutions by practicing higher order thinking skills and analyzing, interpreting and discussing results and information. So practicing self-learning and continuous learning skills with the ability to make decisions and form positive attitudes towards teamwork within a team and developing individual responsibility.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4 hrs. Theoretical	Origin of petroleum and chemical processes	Its presence and extraction, methods of processing, chemical composition of crude oil.	lecture	Monthly exams
2	4 hrs. Theoretical	Thermal pyrolysis and transformation processes	Thermal pyrolysis to form alkenes, catalytic thermal pyrolysis, catalytic synthesis conversion process, catalytic isomerization, and catalytic alkylation	lecture	Monthly exams
3	4 hrs. Theoretical	Petrochemical industries	Ethylene, ethyl alcohol, polyethylene. Ethylene oxide, ethylene glycol, styrene, propylene, polypropylene, acrylonitrile, isopropyl alcohol, cumene. Butyl and isobutyl alcohol, propyl oxide, acrolein, acetone, isoprene, butadiene, acetylene.	lecture	Monthly exams
4	4 hrs. Theoretical	Aromatic materials in petrochemical industries	Benzene, toluene, xylene, thermal cracking of naphtha, and alkylation of toluene.	lecture	Monthly exams
5	4 hrs. Theoretical		Intermediate aromatic compounds resulting from nitration, sulfonation, and alkylation.	lecture	Monthly exams
6	4 hrs. Theoretical	Halogen materials in petrochemical industries	Methyl, ethyl, vinyl, allyl chlorides	lecture	Monthly exams
v	4 hrs. Theoretical	Oxidation processes in petrochemical	Oxidation involving free radicals in the liquid phase.	lecture	Monthly exams

		industries	Oxidation of cumene to produce phenol, and acetone, oxidation of toluene to produce phenol.		
8	4 hrs. Theoretical	Oxidation processes in petrochemical industries	Manufacture of phenol from benzene sulfonate, manufacture of phenol from chlorobenzene, oxidation to produce terephthalic acid and its derivatives.	lecture	Monthly exams
9	4 hrs. Theoretical	Glass industry	Glass industry, types of glass.	lecture	Monthly exams
10	4 hrs. Theoretical	Corrosion	Corrosion in chemical industries, corrosion theories, influencing factors and corrosion.	lecture	Monthly exams
11	4 hrs. Theoretical	Water and industry	Eliminate temporary and permanent hardness in water.	lecture	Monthly exams
12	4 hrs. Theoretical	Water and industry	Methods for removing hardness - physical and chemical methods, ion exchange method, and uses of water in industry.	lecture	Monthly exams
13	4 hrs. Theoretical	Cement industry	Cement industry, types of cement and its properties, methods of cement production, mechanics of cement work.	lecture	Monthly exams
14	4 hrs. Theoretical	Environmental pollution	Degrees of pollution, forms of environmental pollution, air pollutants, pollution control.	lecture	Monthly exams
15	4 hrs. Theoretical	Oxides	Carbon monoxide gases, nitrogen oxides, dust and particulates, controlling air pollutants.	lecture	Monthly exams

35. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Industrial Chemistry - University of Baghdad / College of Education / Ibn Al-Haytham - Dr. Jawad Kazem and others, 1989.
Main references (sources)	<ul style="list-style-type: none"> ➤ Environmental Pollution, Gorgis Abad Al Adam, Ministry of Higher Education and Scientific Research, University of Basra, Iraq, 1988. ➤ Industrial chemistry and its raw materials - Ministry of Higher Education and Scientific Research - University of Basra / Written by - Dr. Ali Falih Ajam and others / 1989.
Recommended books and references (scientific journals, reports...)	Research related to petrochemical industries
Electronic References, Websites	

Course Description Form

1. Course Name:	
Physical chemistry (quantum and spectroscopy)	
2. Course Code:	
CHEM445	
3. Semester / Year:	
First semester/2023-2024	
4. Description Preparation Date:	
12/11/2023	
5. Available Attendance Forms:	
Daily, at the time specified in the schedule, and at full time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60hr./4 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Hameed KhalidAli Email: dr.hameedkhalid@uoanbar.edu.iq	
8. Course Objectives	
Course Objectives	The course aims to study the main topics: This course aims to introduce the student to the basic laws of chemical union and the stability of atomic and molecular systems, by addressing ancient quantum theory and then arriving at modern quantum theory, including its wave and matrix formulation, and linking this information with modern developments related to the emergence of nanotechnology.
9. Teaching and Learning Strategies	
Strategy	<p>The student's knowledge of ancient quantum theory concepts.</p> <p>The student's knowledge of the basic concepts and principles of modern quantum theory (wave mechanics).</p> <p>Knowledge of the quantum model of atomic structure.</p> <p>The student masters the use of wave and matrix quantization methods to obtain the energy levels and wave functions of the system.</p> <p>Quantitative processing of spectral data. Quantitative interpretation of the structure and stability of matter.</p>

10. Course Structure

The week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
1	4 theoretical	Ancient quantum theory	Ancient quantum theory	Lecture + laboratory	Weekly and monthly exams
2	4 theoretical	Mathematical introduction	Introduction	Lecture + laboratory	Weekly and monthly exams
3	4 theoretical	Classic mechanics	Introduction	Lecture + laboratory	Weekly and monthly exams
4	4 theoretical	Wave equation (time-independent Schrödinger equation)	Basic hypotheses of quantum mechanics	Lecture + laboratory	Weekly and monthly exams
5	4 theoretical	Quantum mechanical hypotheses (wave function)	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
6	4 theoretical	Influences	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
7	4 theoretical	Eigenvalue equation	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
8	4 theoretical	The time-independent Schrödinger equation	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
9	4 theoretical	Dirac representation of quantum mechanics	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
10	4 theoretical	Particle system in a box	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
11	4 theoretical	Quantum tunneling effect	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
12	4 theoretical	The waveform of a harmonic oscillator	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
13	4 theoretical	Matrix formula for harmonic oscillator	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams
14	4 theoretical	Hard rotor	Basic hypotheses	Lecture	Weekly and

			of quantum mechanics		monthly exams
15	4 theoretical	Complete solution of the hydrogen atom	Basic hypotheses of quantum mechanics	Lecture	Weekly and monthly exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Salem Muhammad Khalil, Principles of Quantum Chemistry, University of Mosul 1982. Qais Abdul Karim, Quantum Chemistry and Molecular Spectroscopy, University of Basra, 1988.
Main references (sources)	Nouri Al-Mashhadani, Physical Chemistry, University Baghdad 1988.
Recommended books and references (scientific journals, reports...)	I. Levine, Quantum Chemistry , 5th edition, Prentic Hall 2000
Electronic References, Websites	Y. Peleg, Schaum outline of Quantum Mechanics, Mechanics, McGraw Hill 1977.

Course Description Form

10. Course Name:					
Computers					
11. Course Code:					
first stage					
12. Semester / Year:					
Courses - semester					
13. Description Preparation Date:					
2 – 4 – 2024					
14. Available Attendance Forms:					
Daily, at the time specified in the schedule, and at full time					
15. Number of Credit Hours (Total) / Number of Units (Total)					
4 hours					
16. Course administrator's name (mention all, if more than one name)					
Name: Rafid Sayhood Abdulaziz					
Email: rafid.alhashimy@uoanbar.edu.iq					
17. Course Objectives					
Course Objectives	<ul style="list-style-type: none"> Teaching the student how to use and manage the computer and its programs and applications help the student complete projects, print, create presentations have full knowledge of using the Internet due to the need for it in many fields, including education, marketing, and electronic correspondence 				
18. Teaching and Learning Strategies					
Strategy	<p>The student's knowledge of the parts of a computer, its accessories, and ways to use it.</p> <p>The student's ability to apply what he has learned on the computer in laboratory.</p>				
19. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	4 Theoretical	An introductory introduction to the computer	Computer basics	lecture	Monthly exams
٢	4 Theoretical	Identify computer generations	Computer basics	lecture	Monthly exams
٣	4 Theoretical	Areas of computer use	Computer basics	lecture	Monthly exams
٤	4 Theoretical	Physical components of computer	Computer components	lecture	Monthly exams

٥	4 Theoretical	Output devices	Computer components	lecture	Monthly exams
٦	4 Theoretical	Internal parts of the system unit	Computer components	lecture	Monthly exams
٧	4 Theoretical	Storage capacities	Computer components	lecture	Monthly exams
٨	4 Theoretical	Software components	Computer components	lecture	Monthly exams
٩	4 Theoretical	Numerical systems	Computer components	lecture	Monthly exams
١٠	4 Theoretical	BIOS	Computer components	lecture	Monthly exams
١١	4 Theoretical	Personal computer	Computer components	lecture	Monthly exams
١٢	4 Theoretical	Computer platform	Computer components	lecture	Monthly exams
١٣	4 Theoretical	Software security licenses	Computer components	lecture	Monthly exams
١٤	4 Theoretical	Operating systems	Computer components	lecture	Monthly exams
١٥	4 Theoretical	Features of Windows 7 operating system	Computer components	lecture	Monthly exams

20. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

21. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Computer basics and office applications - Ministry of Comprehensive Scientific Education / Advanced Research Department.
Main references (sources)	- Introduction to the Computer / Ahmed Mohamed Ibrahim. - Computer Basics / Tariq Al-Nasuri.
Recommended books and references (scientific journals, reports...)	computer fundamentals, certificate in library and information science
Electronic References, Websites	ar.wikihow.com/