

**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

2026/2025

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: **Samarra**

Faculty/Institute: **Education of pure science**

Scientific Department: **chemistry**

Academic or Professional Program Name: **Bachelor of education in
chemistry science**

Final Certificate Name: **Bachelor of education in chemistry science**

Academic System: **annual**

Description Preparation Date: **25/3/2026**

File Completion Date: **10/5/2026**

Signature:



Head of Department Name:

Professor doctor: Liqaa Hussein Alwan

Date: **21/ 6 /2026**

Signature:



Scientific Associate Name:

doctor: Ayman Saddaq Jaffar

Date: **/ 6 /2026**

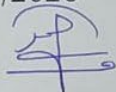
The file is checked by: **Mohammed dahham hameedi**

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

Date: **/ 6 /2026**

Signature:



Approval of the Dean

Professor doctor: Sabah Allawi Khalaf

Date: **2026/ 6 / 22**

1. Program Vision

The department should be able to keep pace with the latest scientific and practical techniques in chemistry. The department also seeks to achieve excellence in teaching chemistry for primary and postgraduate studies by applying quality and reliability standards in a climate characterized by independence and stimulating ambition and creativity in a way that contributes to achieving development in the areas of life.

2. Program Mission

Preparing students who are scientifically and practically proficient in the various fields of chemistry and its applications, as well as striving to provide strong and advanced scientific research and scientific programs rich in information and skills, and to graduate students who can work in various fields and who also can teach and deliver information to students and provide them with the life skills necessary for success.

3. Program Objectives

The main goal is to provide society with work resources and cadres in various educational and pedagogical fields in addition to the industrial, environmental, and biological sectors through:

1. Preparing scientific competencies from holders of higher degrees (Master's and Ph.D.) in the various branches of chemistry, which include the sciences of physical, organic, inorganic, analytical, biological, and industrial chemistry.
1. Preparing human cadres knowledgeable and familiar with the sciences of chemistry so that they can carry out the teaching duties of chemistry with high-level qualifications.
2. Developing students and providing them with the latest scientific curricula and courses in the various branches of chemistry
3. Building leadership qualities in graduates by training them to work as one team.
4. Support and provide a new work environment for students and faculty members.
5. Conducting training courses and seminars for students and faculty members to spread scientific culture among members of society.
6. Taking advantage of all available capabilities and techniques to contribute to the development and improvement of administrative and academic work within a distinguished educational environment that embraces study and experimentation and contributes to maintaining comprehensive quality in education.
7. Caring for, supporting, and encouraging outstanding students.

4. Program Accreditation

Do not available

5. Other external influences

Do not available

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	10	20	%50	A university requirement for all levels of study
College Requirements	9	36	%25	A university requirement for all levels of study
Department Requirements	23	125	18.4%	A university requirement for all levels of study
Summer Training	Available			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First /2025-2026	Chem.1.1	Organic Chemistry	2	2
First /2025-2026	Chem.1.2.	Inorganic Chemistry	2	0
First /2025-2026	Chem.1.3.	Analytical Chemistry	3	2
First /2025-2026	Chem.1.4.	Biology	1	2
First /2025-2026	Chem.1.5.	Mathematics	1	0
First /2025-2026	Chem.1.6.	Fundamentals of Education	2	0
First /2025-2026	Chem.1.7.	Developmental and Educational Psychology	2	0

First /2025-2026	Chem.1.8.	Chemical safety and security	1	0
First /2025-2026	Chem.1.9.	Computer	1	0
First /2025-2026	Chem.1.10.	Arabic Language	2	0
First /2025-2026	Chem.1.11.	English Language	1	0
First /2025-2026	Chem.1.12.	Democracy and Human Rights	1	0
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Second/2025-2026	Chem.2.1.	Organic Chemistry	2	2
Second/2025-2026	Chem.2.2.	Inorganic Chemistry	2	2
Second/2025-2026	Chem.2.3	Analytical Chemistry	3	2
Second/2025-2026	Chem.2.4.	Physical Chemistry	3	2
Second/2025-2026	Chem.2.5.	Mathematics	1	0
Second/2025-2026	Chem.2.6.	Educational Leadership and Management	2	0
Second/2025-2026	Chem.2.7.	Curricula and Textbooks	1	2
Second/2025-2026	Chem.2.8.	Teaching Thinking Skills	1	0
Second/2025-2026	Chem.2.9.	Computers	1	1
Second/2025-2026	Chem.2.10.	Arabic Language	1	0
Second/2025-2026	Chem.2.11.	English Language	1	0
Second/2025-2026	Chem.2.12.	Crimes the Defunct Baath Party	1	0
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Third/2025-2026	Chem.3.1.	Organic Chemistry	2	3
Third/2025-2026	Chem.3.2.	Inorganic Chemistry	2	3
Third/2025-2026	Chem.3.3.	Industrial Chemistry	2	0
Third/2025-2026	Chem.3.4.	Physical Chemistry	3	2

Third/2025-2026	Chem.3.5.	Biochemistry	2	2
Third/2025-2026	Chem.3.6.	Elective	2	0
Third/2025-2026	Chem.3.7.	Counseling and Psychological Health	2	0
Third/2025-2026	Chem.3.8.	Research Methodology	2	0
Third/2025-2026	Chem.3.9.	Curriculum and Teaching Methods	2	0
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Forth/2025-2026	Chem.4.1.	Organic Identification	2	3
Forth/2025-2026	Chem.4.2.	Biochemistry	2	0
Forth/2025-2026	Chem.4.3.	Instrumental Analysis	3	2
Forth/2025-2026	Chem.4.4.	Industrial Chemistry	2	2
Forth/2025-2026	Chem.4.5.	Spectral and Quantum Chemistry	2	0
Forth/2025-2026	Chem.4.6.	Elective	2	0
Forth/2025-2026	Chem.4.7.	Research Project	2	0
Forth/2025-2026	Chem.4.8.	Measurement and Evaluation	2	0
Forth/2025-2026	Chem.4.9.	Observation and Application	1	2

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	-The student will have the ability to know and understand the principles, theories and basics of chemistry. -The student will have the ability to understand modern and advanced scientific topics in the various branches of chemistry. -The student will be able to understand the basics of the operation of laboratory equipment used in his field of specialization.

	- Improving teaching, learning and assessment, and guiding students in their learning in light of specific and clear objectives that accurately explain what is expected of them.
Skills	
Learning Outcomes 2	- The student acquires dialogue and discussion skills. - That the student can reach different cognitive conclusions.
Learning Outcomes 3	- The ability to communicate constructively through the ability to work as a team.
Ethics	
Learning Outcomes 4	Developing students' professional and practical abilities to use the knowledge material in professional or practical applications, which the student is expected to acquire upon completing his studies in the program through his ability to teach a lesson in a classroom, for example.

9. Teaching and Learning Strategies

A- Cognitive objectives:

- 1- Developing students' knowledge content in a way that is compatible with scientific development in the field of specialization locally and globally.
- 2- Relying on teaching and learning strategies and methods appropriate to the nature of the scientific subject being studied to achieve the best knowledge return.

B- Emotional goals:

- 1- Developing the spirit of belonging among students.
- 2- Developing the principles of practicing the profession and the value of working within a team.
- 3- Belief in the value of self-learning and renewing personal motivation.

C- Skill objectives:

- 1- Developing students' research and investigation skills.
- 2- Developing students' teamwork and cooperative skills.
- 3- Developing students' logical, critical, and creative thinking skills.
- 4- Developing personal skills such as criticism, expression, presentation, and free, democratic discussion.
- 5- Developing the specialized skills necessary for safe and distinguished practice of the profession

10. Evaluation methods

Daily , monthly exams and final exam.

11. Faculty						
Faculty Members						
Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemistry	Physical			1	
	Chemistry	organic			0	
	Chemistry	Inorganic			0	
	Chemistry	Biochemistry			1	
	Chemistry	Analysis			1	
	Mathematics	Mathematics			1	
Assistant Professor	Chemistry	Physical			0	
	Chemistry	organic			3	
	Chemistry	Inorganic			1	
	Chemistry	Biochemistry			1	
	Chemistry	Analysis			1	
	Chemistry	Industrial			2	
	Chemical engineering	Chemical engineering			1	
Lecturer	Chemistry	Physical			2	
	Chemistry	organic			1	
	Chemistry	Inorganic			2	
	Chemistry	Biochemistry			4	
	Chemistry	Analysis			7	
	Chemistry	Industrial			1	
	Agriculture	Animal psychology			1	
	English	Language Science			1	
Assistant	Chemistry	Physical			8	

Lecturer	Chemistry	organic			6	
	Chemistry	Inorganic			4	
	Chemistry	Biochemistry			5	
	Chemistry	Analysis			3	
	Chemistry	Industrial			0	
	Chemical engineering	Water treatment			1	
	Agriculture	animal production			1	

Professional Development

Mentoring new faculty members

-Guiding new faculty members by preparing plans for training programs to develop the skills and abilities of faculty members.

- Creating databases for the qualifications and experiences of new faculty members to demonstrate the optimal benefit from their qualifications and experience.

Professional development of faculty members

Professional development for faculty members by urging the faculty to participate in local, regional and international conferences, development courses and training workshops.

12. Acceptance Criterion

The Chemistry Department is subject to the central admission plan of the Ministry of Higher Education and Scientific Research, where lists are issued by the Ministry. After that, students are distributed among the departments in the college according to the average and the desire of the student in the department, and the college is fully committed to the laws, regulations, and instructions.

13. The most important sources of information about the program

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14. Program Development Plan

Developing curricula by adopting the latest methodological regulations.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First /2024-2025	Chem.1.1	Organic Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	
First /2024-2025	Chem.1.2.	Inorganic Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.3.	Analytical Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.4.	Biology	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.5.	Mathematics	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.6.	Fundamentals of Education	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.7.	Educational psychology	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.8.	Chemical safety and security	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.9.	Computer	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.10	Arabic Language	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.11	English Language	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
First /2024-2025	Chem.1.12	Democracy and Human Rights	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second/2024-2025	Chem.2.1	Organic Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	
Second/2024-2025	Chem.2.2	Inorganic Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.3	Analytical Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.4	Physical Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.5	Mathematics	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.6	Education Administration and Secondary Education	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.7	Developmental Psychology	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.8	Computers	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.9	English Language	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Second/2024-2025	Chem.2.10.	Crimes the Defunct Baath Party	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Third/2024-2025	Chem.3.1.	Organic Chemistry	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Third/2024-2025	Chem.3.2.	Coordination Chemistry	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Third/2024-2025	Chem.3.3.	Industrial Chemistry	Basic	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Third/2024-2025	Chem.3.4.	Physical Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Third/2024-2025	Chem.3.5.	Biochemistry	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Third/2024-2025	Chem.3.6.	Elective	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Third/2024-2025	Chem.3.7.	Educational Counseling and Psychological Health	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Third/2024-2025	Chem.3.8.	Fundamentals of Scientific Research	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	
Third/2024-2025	Chem.3.9.	Curriculum and Teaching Methods	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Third/2024-2025	Chem.3.10	English Language	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Forth/2024-2025	Chem.4.1.	Organic Identification	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Forth/2024-2025	Chem.4.2.	Biochemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	
Forth/2024-2025	Chem.4.3.	Instrumental Analysis	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Forth/2024-2025	Chem.4.4.	Industrial Chemistry	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Forth/2024-2025	Chem.4.5.	Spectral and Quantum Chemistry	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Forth/2024-2025	Chem.4.6.	Elective	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Forth/2024-2025	Chem.4.7.	Research Project	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Forth/2024-2025	Chem.4.8.	Measurement and Evaluation	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Forth/2024-2025	Chem.4.9.	Practical Education	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Forth/2024-2025	Chem.4.10	English Language	Basic	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

Course Description for All Academic Levels

Chemistry Department/College of Education For

Pure Science /Samarra University

2026/2025

First stage

Course Description Form

1. Course Name:					
Organic chemistry					
2. Course Code:					
Chem.1.1					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
22-12-2025					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60/6					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Muath Jabbar Tarfa			Email: maath52@uosamarra.edu.iq		
Name: Mohammed Dahim Humedi			Email: mohamed.d.h@uosamarra.edu.iq		
8. Course Objectives					
1. After completing this course, it is expected that the graduate will be able to understand the importance and uses of important organic compounds in daily life, with a focus on medications. 2. Linking chemistry to daily life to the fullest extent possible, given its growing impact in industries, agriculture, medications, cosmetics, and other fields. 3. Keeping pace with advancements in various aspects of life, as the foundation of this lies in understanding the composition and properties of matter.					
9. Teaching and Learning Strategies					
Strategy		White board, smart board and effective social media communication			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2 theoretical	Elements, compounds, compounds, atoms, molecules, configuration and periodic table	General principles	Lecture as Reactive discussion + lab	Weakly and course exams
second	2 theoretical	Covalent bonding, formation of molecules, hybridization, single and multi- bonding	General principles	Lecture as Reactive discussion + lab	Weakly and course exams
third	2 theoretical	Polar covalent bonding, acids and bases, resonance, structures and properties	General principles	Lecture as Reactive discussion + lab	Weakly and course exams
fourth	2 theoretical	Configuration of carbon	Aliphatic	Lecture as	Weakly

		atom, sigma bond, physical properties, resources, methane, ethane, propane, butane	hydrocarbons (Alkanes)	Reactive discussion + lab	and course exams
fifth	2 theoretical	Analysis of conformation, free rotation, structural formulation, nomenclature	Aliphatic hydrocarbons (Alkanes)	Lecture as Reactive discussion + lab	Weakly and course exams
Sixth	2 theoretical	Preparation, reactions, chain-reactions, analysis of alkanes	Aliphatic hydrocarbons (Alkanes)	Lecture as Reactive discussion + lab	Weakly and course exams
Seventh	2 theoretical	Nomenclature, physical properties	Cyclo alkanes	Lecture as Reactive discussion + lab	Weakly and course exams
Eighth	2 theoretical	Conformation, Preparation	Cyclo alkanes	Lecture as Reactive discussion + lab	Weakly and course exams
Ninth	2 theoretical	reactions	Cyclo alkanes	Lecture as Reactive discussion + lab	Weakly and course exams
tenth	2 theoretical	Nomenclature, physical properties	alkenes	Lecture as Reactive discussion + lab	Weakly and course exams
Eleventh	2 theoretical	Pi-bonds, geometrical isomers, preparation	alkenes	Lecture as Reactive discussion + lab	Weakly and course exams
Twelfth	2 theoretical	Reactions, identifications of alkenes	alkenes	Lecture as Reactive discussion + lab	Weakly and course exams
Thirteenth	2 theoretical	Structure, Nomenclature Stability, physical properties, preparation	Dienes	Lecture as Reactive discussion + lab	Weakly and course exams
Fourteenth	2 theoretical	reactions	Dienes	Lecture as Reactive discussion + lab	Weakly and course exams
Fifteenth	1 theoretical	identifications of dienes	Dienes	Lecture as Reactive discussion + lab	Weakly and course exams
Sixteenth	2 theoretical	Structure, Nomenclature , physical properties,	alkynes	Lecture as Reactive	Weakly and course

		resources, preparation		discussion + lab	exams
Seventeenth	2 theoretical	Preparation, reactions,	alkynes	Lecture as Reactive discussion + lab	Weakly and course exams
Eighteenth	1 theoretical	identifications of alkynes	alkynes	Lecture as Reactive discussion + lab	Weakly and course exams
Nineteenth	2 theoretical	Benzene, molecular formula, Stability, resonance, carbon-carbon bonds in benzene, aromatic character	Aromatic hydrocarbons	Lecture as Reactive discussion + lab	Weakly and course exams
Twentieth	2 theoretical	Nomenclature, reactions Orientation, mechanism of electrophilic substitution	Aromatic hydrocarbons	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-first	2 theoretical	Effect of halogens on benzene ring toward reactivity and orientation, Arenes, preparation, reactions, identification of benzene and its derivatives	Aromatic hydrocarbons	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-second	2 theoretical	Nomenclature physical properties, resources, preparation	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-third	2 theoretical	Reactions, Nucleophilic substitution	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-fourth	2 theoretical	Reactions, elimination, identification of alkyl halides	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-fifth	2 theoretical	Nomenclature, Classification, physical properties, resources, monohydroxyl alcohol	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-sixth	2 theoretical	Preparation, synthesis by Grignard reagent	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-seventh	2 theoretical	identification of alcohol	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
Twenty-	2 theoretical	Nomenclature,	Ethers	Lecture as	Weakly

eighth		physical properties, preparation, Reactions		Reactive discussion + lab	and course exams
twenty-ninth	2 theoretical	epoxides	Ethers	Lecture as Reactive discussion + lab	Weakly and course exams
thirtieth	2 theoretical	identification of ethers	Ethers	Lecture as Reactive discussion + lab	Weakly and course exams

11. Course Evaluation

- Course exams 60
- Weak exams 20
- Reports 10
- Remarkable participations 10

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	ORGANIC CHEMISTRY By Robert Thornton Morrison and Robert Neilson Boyd
Main references (sources)	Organic Chemistry, written by Dr. Muhammad Nizar Ibrahim - College of Education - University of Mosul.
Recommended books and references (scientific journals, reports...)	VOGEL S Textbook of PRACTICAL ORGANIC CHEMISTRY Organic Chemistry by Paula Yurkanis Bruice Iraqi Academic Scientific Journals: https://www.iasj.net
Electronic References, Websites	https://2u.pw/3oWYspkg https://t.me/organicbook

Course Description Form

1. Course Name:	Practical organic chemistry/third stage
2. Course Code:	Chem.B.1.1.
3. Semester / Year:	2025/12/22

4. Description Preparation Date:

2026/6/13

5. Available Attendance Forms:

daily

6. Number of Credit Hours (Total) / Number of Units (Total)

60 hours/6 units

7. Course administrator's name (mention all, if more than one name)

Name: Mustafa Abdel Qader Fadel

Email: mostafa.abd@uosamarra.edu.iq**8. Course Objectives**

□ **Recognizing Applied Significance:** Enhancing students' awareness of the pivotal role of organic chemistry and its direct applications in the industrial, pharmaceutical, agricultural, and environmental fields.

□ **Building a Knowledge Base:** Equipping students with a comprehensive and balanced scientific foundation that covers fundamental concepts, theories, and technical skills in organic chemistry.

□ **Developing Problem-Solving Skills:** Empowering students to apply acquired chemical knowledge and skills to analyze and solve scientific problems (both theoretical and applied), in alignment with the requirements of the Sustainable Development Goals (SDGs).

□ **Specialized Professional Development:** Refining students' qualitative and specialized skills to elevate their scientific competence in their specific field of chemistry.

□ **Social Responsibility and Practical Application:** Preparing students to effectively utilize their acquired skills to serve the community and meet the environmental and industrial demands of the labor market.

Cognitive,
Behavioral, and
Practical**9. Teaching and Learning Strategies**

Strategy	A. Cognitive Objectives 1. Enabling students to acquire the theoretical knowledge of organic chemistry. 2. Familiarizing students with chemical structures, hybridization types, carbon geometries and classifications, alkanes, alkenes, alkynes, saturated and unsaturated cyclic compounds, spatial configurations (stereochemistry) and their stability, aliphatic and cyclic ethers, and alcohols. 3. Introducing students to the reaction mechanisms for the synthesis of alkanes, alkenes, alkynes, saturated and unsaturated cyclic compounds, spatial configurations and their stability, aliphatic and cyclic ethers, and alcohols. B. Course-Specific Skills Objectives 1. The student masters the synthesis of alkanes, alkenes, alkynes, saturated and unsaturated cyclic compounds, their spatial configurations and stability, aliphatic and cyclic ethers, and alcohols. 2. Differentiating between various compounds, including alkanes, alkenes, alkynes, saturated and unsaturated cyclic compounds, aliphatic and cyclic ethers, and alcohols. 3. The student masters drawing the specific structural formulas of various organic compounds. Teaching and Learning Methods 1. Lectures. 2. Visual aids, such as smartboards. 3. Use of a projector, alongside the utilization of laboratory materials and measurement instruments. Assessment Methods 1. Oral examinations. 2. Conducting daily quizzes and monthly examinations. 3. Brainstorming. 4. Dialogue and discussion.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2practica	Understanding, Analysis, and Application	Introduction to Carbon Chemistry & Hybridization	Lecture	Examination / Assessment
2	2practica	Understanding, Analysis, and Application	(Alkanes)	Lecture	Examination / Assessment
3	2practica	Understanding, Analysis	(Methods of Preparation)	Lecture	Examination /

		, and Application			Assessment
4	2practica	Understanding, Analysis, and Application	(Reactions & Mechanisms)	Lecture	Examination / Assessment
5	2practica	Understanding, Analysis, and Application	(Alkenes)	Lecture	Examination / Assessment
6	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
7	2practica	Understanding, Analysis, and Application	(Reactions & Electrophilic Additions)	Lecture	Examination / Assessment
8	2practica	Understanding, Analysis, and Application	(Alkynes)	Lecture	Examination / Assessment
9	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
10	2practica	Understanding, Analysis, and Application	(Reactions of Alkynes)	Lecture	Examination / Assessment
11	2practica	Understanding, Analysis, and Application	Diene	Lecture	Examination / Assessment
12	2practica	Understanding, Analysis, and Application	Reactions of Diene	Lecture	Examination / Assessment
13	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
14	2practica	Understanding, Analysis, and Application	(Saturated Alicyclic Compounds / Cycloalkanes)	Lecture	Examination / Assessment
15	2practica	Understanding, Analysis, and Application	(Preparation & Stability)	Lecture	Examination / Assessment
16	2practica	Understanding, Analysis, and Application	(Reactions of Cycloalkanes)	Lecture	Examination / Assessment
17	2practica	Understanding, Analysis, and Application	(Unsaturated Alicyclic Compounds / Cycloalkenes):	Lecture	Examination / Assessment
18	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
19	2practica	Understanding, Analysis, and Application	(Reactions of Cycloalkenes)	Lecture	Examination / Assessment
20	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
21	2practica	Understanding, Analysis, and Application	(Reactions of Diene)	Lecture	Examination / Assessment
22	2practica	Understanding, Analysis, and Application	(Ethers)	Lecture	Examination / Assessment
23	2practica	Understanding, Analysis, and Application	(Methods of Preparation)	Lecture	Examination / Assessment
24	2practica	Understanding, Analysis, and Application	(Reactions & Cleavage of Ethers)	Lecture	Examination / Assessment
25	2practica	Understanding, Analysis, and Application	(Cyclic Ethers / Epoxides):	Lecture	Examination / Assessment
26	2practica	Understanding, Analysis, and Application	(Preparation & Ring-Opening Reactions of Epoxides)	Lecture	Examination / Assessment
27	2practica	Understanding, Analysis, and Application	(Alcohols)	Lecture	Examination / Assessment
28	2practica	Understanding, Analysis, and Application	(Methods of Preparation):	Lecture	Examination / Assessment
29	2practica	Understanding, Analysis, and Application	(Reactions of Alcohols):	Lecture	Examination / Assessment
30	2practica	Understanding, Analysis, and Application		Lecture	Examination / Assessment

11. Course Evaluation	
30 Course exams 15 Weak exams 1 Reports	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Organic chemistry by graham solmons/translated to Arabic by adel al-garar
Main references (sources)	الكيمياء العضوية تأليف د. بديع علي احمد و د. سالم حامد و أ. خالد فتحي الشاهري طبع في مطبعة جامعة الموصل عام 1991.
Recommended books and references (scientific journals, reports...)	مبادئ الكيمياء العضوية تأليف أ.د. محمد مجدي واصل / القاهرة. اساسيات الكيمياء العضوية تأليف أ.د. محمد مجدي واصل.
Electronic References, Websites	https://arabian-chemistry.com https://scholar.google.com

Course Description Form

1. Course Name:	
Inorganic Chemistry	
2. Course Code:	
Chem.1.2	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
15-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Bakr Ismail Jasem Email: bakrchem@gmail.com	
8. Course Objectives	
Course Objectives	- To teach first-year chemistry students the fundamentals of inorganic chemistry. - To introduce scientific developments in the field, enabling students to teach the subject at intermediate and high school levels. - To understand theoretical foundations, apply concepts, and develop skills in problem-solving and structured scientific thinking.
9. Teaching and Learning Strategies	

Strategy		• Lecture-based method and discussion with questions. • Use of overhead projector. • Use of illustrations and multimedia tools.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Energy sequence of sublevels and Hund's and Pauli's exclusion principles	Continuation of quantum numbers	Lecture + Presentation	In-class questions
Second	2	Mendeleev’s periodic table and arrangement basics	Modern periodic table	Lecture + Presentation	In-class questions + Quiz
Third	2	Classification of periodic table elements into blocks with examples	Periodic table blocks	Lecture + Presentation	In-class questions
Fourth	2	Grouping periodic table elements into periods with examples	Periods of the periodic table	Lecture + Presentation	In-class questions
Fifth	2	Determining term symbols of elements with examples	Term symbol	Lecture + Presentation	In-class questions
Sixth	2	Effective nuclear charge with examples	Shielding and periodic properties	Lecture + Presentation	In-class questions + Quiz
Seventh	2	Atomic radius and ionization energy	Periodic properties	Lecture + Presentation	In-class questions
Eighth	2	Electron affinity and electronegativity	Continuation of periodic properties	Lecture + Presentation	In-class questions
Ninth	2	Ionic compound formation and conditions	Ionic compounds	Lecture + Presentation	In-class questions
tenth	2	Polarization and its rules	Polarization of ionic compounds	Lecture + Presentation	In-class questions + Quiz
Eleventh	2	Coordination numbers and geometrical shapes	Coordination numbers	Lecture + Presentation	In-class questions
Twelfth	2	Conditions for covalent bond formation	Covalent compounds	Lecture + Presentation	In-class questions

				ion	
Thirteenth h	2	Valence bond theory	Theories of covalent bond formation	Lecture + Presentation	In-class questions
Fourteenth h	2	Molecular orbital theory	Continuation of covalent bond theories	Lecture + Presentation	In-class questions + Quiz
Fifteenth	2	Energy sequence of sublevels and Hund's and Pauli's exclusion principles	Continuation of quantum numbers	Lecture + Presentation	In-class questions
Sixteenth	2	Mendeleev's periodic table and arrangement basics	Modern periodic table	Lecture + Presentation	In-class questions
Seventeenth th	2	Classification of periodic table elements into blocks with examples	Periodic table blocks	Lecture + Presentation	In-class questions
Eighteenth h	2	Grouping periodic table elements into periods with examples	Periods of the periodic table	Lecture + Presentation	In-class questions + Quiz
Nineteenth h	2	Determining term symbols of elements with examples	Term symbol	Lecture + Presentation	In-class questions
Twenty	2	Effective nuclear charge with examples	Shielding and periodic properties	Lecture + Presentation	In-class questions
Twenty-first	2	Atomic radius and ionization energy	Periodic properties	Lecture + Presentation	In-class questions
Twenty-second	2	Electron affinity and electronegativity	Continuation of periodic properties	Lecture + Presentation	In-class questions + Quiz

11. Course Evaluation

Quizzes 2 + Daily Attendance 3 + First monthly exam 20 = 25 marks

Quizzes 2 + Daily Attendance 3 + Second monthly exam 20 = 25 marks

Final Exam 50 marks

12. Learning and Teaching Resources

Required textbooks	Modern Inorganic Chemistry – Prof. Sajid Al-Khilani
Main references (sources)	Inorganic Chemistry – Dr. Mohammed Abdulrahman Jawhar
Recommended books and references (scientific journals, reports...)	Inorganic Chemistry – Gary L. Miessler & Donald A. Tarr, 3rd Ed., 2004, Pearson –

	Prentice Hall
Electronic References, Websites	• https://ptable.com/?lang=en#Properties • https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch6/quantum.html • https://chem.libretexts.org/Bookshelves/General_Chemistry/Chem1_(Lower)/09%3A_Chemical_Bonding_and_Molecular_Structure/9.08%3A_Molecular_Orbital_Theory • https://byjus.com/chemistry/valence-bond-theory/#:~:text=What%20is%20the%20valence%20bond,a%20hybrid%20orbital%20is%20formed.

Course Description Form

1. Course Name:	
Analytical Chemistry	
2. Course Code:	
Chem3.1.	
3. Semester / Year:	
Annual	
4. Description Preparation Date:	
23/12/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150 hours (theory and practical) / 6 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assoc. Prof. Munim Fareed Hamad Email: believerpc@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	1. Develop academic education at the university and college levels in line with the quality standards in higher education, enabling universities to produce graduates capable of contributing effectively to the job market. 2. Understand the importance of volumetric analysis and how to apply its principles. 3. Familiarize with tools, glassware, materials, and appropriate handling methods. 4. Acquire knowledge of topics related to volumetric analysis, including chemical equilibrium, standard solutions, dissolution factors, normality, formality, molarity, weak and strong acids and bases, and types of indicators used in titration.
9. Teaching and Learning Strategies	
Strategy	Theoretical lectures using modern presentation tools, supplemented

with relevant videos, discussion method, brainstorming, group work, enhancing the theoretical aspect with practical aspects, and conducting practical experiments to understand this science and its components.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3Tho.+3 prac.	Definition of Analytical Chemistry and Its Classification, Differentiation Between Each Type	Introduction	Face-to-face lecture	
2	3Tho.+3 prac	Understanding and Application of Chemical Equilibrium Equation, Classification of Factors Affecting Equilibrium	Chemical Equilibrium	Face-to-face lecture	
3	3Tho.+3 prac	Calculation of Ionization Constant for Simple and Complex Ions, Calculation of Activity Coefficient	Ionic Equilibrium and Ionic Reactions	Face-to-face lecture	
4	3Tho.+3 prac	Classification of Salts and Calculation of Salt Concentration at Equilibrium Point	Hydrolysis of Salts	Face-to-face lecture	
5	3Tho.+3 prac	Application and Calculation of Acidic Function for Each Salt	Hydrolysis of Salts	Face-to-face lecture	
6	3Tho.+3 prac	Definition of Amphoteric Salts and Definition of Buffer Solutions	Hydrolysis of Salts	Face-to-face lecture	
7	3Tho.+3 prac	Calculation of Buffer Solution Range and Calculation of Its Capacity	Hydrolysis of Salts	Face-to-face lecture	
8	3Tho.+3 prac	Definition of Solubility, Classification of Compounds According to Solubility, Application of Solubility Product to Precipitation	Solubility and Solubility Product	Face-to-face lecture	
9	3Tho.+3 prac	Enumeration of Factors Affecting Solubility Product	Solubility and Solubility Product	Face-to-face lecture	

10	3Tho.+3 prac	Application of Solubility Product Constant Law, Solution of Related Problems, Analysis of Results to Determine Material Properties	Solubility and Solubility Product	Face-to-face lecture	Semester and final exams (practical and theoretical)
11	3Tho.+3 prac	Application of Complex Solutions in Qualitative and Quantitative Analysis	Applications of Buffer Solutions	Face-to-face lecture	
12	3Tho.+3 prac	Selection of Model and How to Deal with It	Initial Steps in Analysis	Face-to-face lecture	
13	3Tho.+3 prac	Definition of Volumetric Analysis, Classification of Chemical Reactions, Distinguishing Necessary Requisites for Analysis	Principles of Volumetric Analysis	Face-to-face lecture	
14	3Tho.+3 prac	Definition of Standardization, Calculation of Equivalent Weight for Each Chemical Reaction	Principles of Volumetric Analysis	Face-to-face lecture	
15	3Tho.+3 prac	First Semester Exam		Face-to-face lecture	
16	3Tho.+3 prac	Application of concentration laws and classification of standardization methods	Principles of Volumetric Analysis	Face-to-face lecture	
17	3Tho.+3 prac	Application of concentration laws in solving various problems	Principles of Volumetric Analysis	Face-to-face lecture	
18	3Tho.+3 prac	Definition of acids and bases, and calculation of salt concentration at the equivalence point	Neutralization Titrations	Face-to-face lecture	
19	3Tho.+3 prac	Calculation of acidic function and labeling of titration curves	Neutralization Titrations	Face-to-face lecture	
20	3Tho.+3 prac	Application of non-aqueous titrations and classification of indicator theories	Neutralization Titrations	Face-to-face lecture	

21	3Tho.+3 prac	Definition of oxidation-reduction reactions and application of equilibrium to balance redox reactions	Redox Titrations	Face-to-face lecture	
22	3Tho.+3 prac	Classification of electrochemical theories and classification of electrodes	Redox Titrations	Face-to-face lecture	
23	3Tho.+3 prac	Calculation of voltage from titration curves at different points	Redox Titrations	Face-to-face lecture	
24	3Tho.+3 prac	Classification of titration methods and drawing of titration curves	Precipitation Titrations	Face-to-face lecture	
25	3Tho.+3 prac	Classification of titration methods and drawing of titration curves	Complex Formation Titrations	Face-to-face lecture	
26	3Tho.+3 prac	Definition of amplification reactions and their application in estimation	Gravimetric Reactions	Face-to-face lecture	
27	3Tho.+3 prac	Classification of errors and application of some statistical laws	Data Processing	Face-to-face lecture	
28	3Tho.+3 prac	Integration of topics and calculation of acidic function	Chemical Equilibrium, Ionic Equilibrium, and Acidic Function	Face-to-face lecture	
29	3Tho.+3 prac	Integration of topics for drawing titration curves	Chemical Equilibrium, Ionic Equilibrium, Acidic Function, and Titration Curves	Face-to-face lecture	
30	3Tho.+3 prac	Second semester exam		Face-to-face lecture	

11. Course Evaluation

- **Practical Midterm Exam: 7%**
- **Theoretical Midterm Exam: 18%**
- **Practical Final Exam: 7%**
- **Theoretical Final Exam: 18%**
- **Practical Final Exam: 15%**
- **Theoretical Final Exam: 35%**

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	"Descriptive and Volumetric Analysis" by Muayyad Qasim Al-Abbaji and Thabet Saeed Al-Ghubsha.
Main references (sources)	Skoog.
Recommended books and references (scientific journals, reports...)	"Principles of Analytical Chemistry" by Thabet Saeed Al-Ghubsha.
Electronic References, Websites	/https://www.chemspider.com /https://asdlb.org

Course Description Form

1. Course Name:	
Analytical Chemistry Lab. / First Year	
2. Course Code:	
Chem.1.3.P	
3. Semester / Year:	
year	
4. Description Preparation Date:	
23-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total):	
90 h /6 unite	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Bakr Ismael Aldoori	bakr.aldoori@uosamarra.edu.iq
Name: Nazar Mutlag Hammood	Nazar.mutlaq@uosamarra.edu.iq
Name: Dr. Mahmood Shakir Mahmood	mahmood.shakir@uosamarra.edu.iq
8. Course Objectives	
Course Objectives	• Understanding the basic principles of analytical chemistry. • Developing students' skills in material analysis. • Empowering students to apply their skills in solving real-world problems.
9. Teaching and Learning Strategies	
Strategy	• Lectures. • Laboratory experiment.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	2 Practical	General Introduction to Analytical Chemistry, Steps of Chemical Analysis	Concepts and basic for analytical chemistry	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
2.	2 Practical	Basic Laboratory Safety Procedures	Chemical lab. Safety	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
3.	2 Practical	Familiarization with Laboratory Instruments and Handling Techniques	Chemical apparatuses practice	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
4.	2 Practical	Quantitative Analysis (Group Elements)	Qualitative chemistry	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
5.	2 Practical	Experiment: Individual detection of Group I elements of basic radicals	Identification analysis group I (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
6.	2 Practical	Experiment: Detection of a mixture of Group I elements of basic radicals	Identification unknown of analysis group I (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
7.	2 Practical	Experiment: Individual detection of Group II elements of basic radicals	Identification analysis group II (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
8.	2 Practical	Experiment: Detection of a mixture of Group II elements of basic radicals	Identification unknown of analysis group II (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
9.	2 Practical	Experiment: Individual detection of Group III elements of basic radicals	Identification analysis group III (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
10.	2 Practical	Experiment: Detection of a mixture of Group III elements of basic radicals	Identification unknown of analysis group III (Cations)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
11.	2 Practical	Experiment: Detection of Group I elements of acidic radicals	Identification analysis group I (Anions)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
12.	2 Practical	Experiment: Detection of Group II elements of acidic radicals	Identification analysis group II (Anions)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
13.	2 Practical	Experiment: Detection of Group III elements of acidic radicals	Identification analysis group III (Anions)	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
14.	2 Practical	Quantitative Analysis (Types of Quantitative Analysis)	Quantitative chemistry	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
15.	2 Practical	Volumetric Analysis	Volumetric analysis	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports

16.	2 Practical	Methods for Expressing Chemical Concentrations	Chemistry concentration expression methods	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
17.	2 Practical	Experiment: Preparation of a Standard Solution of a Solid and Liquid Substance	Preparation of a solid and liquid solution in Molarity and Normality.	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
18.	2 Practical	Titration and Its Type	Titrations	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
19.	2 Practical	Chemical Indicators	Chemical indicators	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
20.	2 Practical	Neutralization Titrations	Neutralization titrations	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
21.	2 Practical	Experiment: Titration of HCl with a Primary Standard Substance	Standardization HCl by primary standard	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
22.	2 Practical	Experiment: Neutralization Titrations (Titration of a Strong Acid with a Strong Base)	Strong acid strong base titration	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
23.	2 Practical	Precipitation Titrations	Precipitation titrations	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
24.	2 Practical	Experiment: Mohr's Method	Mohr's method	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
25.	2 Practical	Redox Titrations	Redox titrations	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
26.	2 Practical	Experiment: Titration Using an Oxidizing Agent (Potassium Permanganate)	Titration with oxidation agent KMnO_4	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
27.	2 Practical	Complexometric Titrations	Complexometric titrations	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports
28.	2 Practical	Experiment: Measuring Water Hardness	Hard water test	Lecture + Laboratory	Daily and Term Examinations, and Laboratory Reports

11. Course Evaluation

- Here is the translation of the grade distribution from 100 points according to the tasks assigned to the student:
- First Semester Monthly Exam: 20
- First Semester Daily Exam: 2
- First Semester Reports: 3
- Second Semester Monthly Exam: 20
- Second Semester Daily Exam: 2
- Second Semester Reports: 3
- Annual Effort/Yearly Participation: 15
- Final Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	•Gray D. Christian "analytical Chemistry" seventh Ed. Wiley ed. USA2014 . •Skoog D.; West d. Holler F. and Crouch S."Fundamental of Analytical Chemistry" ninth Ed.Thomson, USA. 2014.
Main references (sources)	"Foundations of Analytical Chemistry" by Al-Khafaji, Jawad Kazem, et al.
Recommended books and references (scientific journals, reports...)	Vogel's"Qualitative Inorganic Analysis" Seventh Edition, Revised by G. Svehla, Longman Group Limited, England 1996.
Electronic References, Websites	•International Union of Pure and Applied Chemistry (IUPAC) Website: https://www.iupac.org/divisions/II/ •Royal Society of Chemistry (RSC) Website: https://www.rsc.org

Course Description Form

1. Course Name:	
General Biology	
2. Course Code:	
Chem1.4	
3. Semester / Year:	
year	
4. Description Preparation Date:	
11/12/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Eman Abas Mohammed	
8. Course Objectives	
Course Objectives	
9. Teaching and Learning Strategies	

Strategy		A- Cognitive objectives 1- Enabling the student to understand the foundations and history of biology 2- Enabling the student to understand the structure of the cell. 3- Identify the main organic compounds in living organisms. 4- Identify growth and reproduction in plants and animals			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	brief historical introduction to biology		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
2	2	The importance of biology and its branches		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
3	2	Metabolism and characteristics of life		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
4	2	The main method of building living materials		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
5	2	Carbohydrates		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
6	2	Lipds		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
7	2	Proteins		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams

8	2	Nucleic acids		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
9	2	Taxation		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
10	2	Classification systems		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
11	2	Basics of plant classification		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
12	2	Growth and reproduction in animals		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
13	2	Sexual and asexual reproduction in animals		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
14	2	Growth and reproduction in primitive organisms		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams
15	2	Sexual and asexual reproduction in plants		Whiteboard + colored pens + PowerPoint slides	Daily and monthly discussions and exams

11. Course Evaluation

1- Assessment by asking students direct questions to determine their comprehension.

2- Assessment by monitoring experiments and the use of laboratory tools and equipment.

3- Conducting a written exam.

4- Homework.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	General biology book in the college library
Main references (sources)	Basics of Biology
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
General Biology/ Practical	
2. Course Code:	
Chem.1.4.p	
3. Semester / Year:	
year	
4. Description Preparation Date:	
11/12/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Hamza Riyadh Abdullhameed Email: hamza.re.ab@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	
9. Teaching and Learning Strategies	
Strategy	A- Cognitive objectives A1- Enabling the student to become familiar with laboratory tools and equipment and the precautions that must be taken inside the laboratory. A2- Enabling the student to know the structure and function of the cell, living and non-living organelles, and cell division. A3- Identify the main organic compounds in living organisms. A4- Identifying and classifying animal tissues. A5- Enabling the student to know the components of blood, the blood drawing process, and the tests that are conducted after the blood drawing

	process. B - The skills objectives of the course B1 - Developing students' skills in using the optical microscope. B2 - Developing students' skills in identifying the types and stages of cell division. B3 - Developing students' skills in identifying and diagnosing animal tissues under the microscope. B4- Developing students' skills in the process of drawing blood and conducting tests. B5- Developing students' skills in recall, analysis and discussion.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Historical overview - definition of biology - the importance of studying it	Introduction	Blackboard + lecture presented in PDF format + dialogue and discussion	Direct questions + practical experiments + daily exam + semester exam
2	3	Identifying the tools used in the laboratory and how to use the optical microscope and identifying its parts while taking laboratory security and safety procedures.	Laboratory - its equipment - tools	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
3	3	An overview of the cell, its discovery and definition of the living cell - shapes and sizes of cells - cell membranes and the transfer of materials across them - organelles of the living and non-living cell	The cell and its components	Blackboard + lecture presented in PDF format + dialogue and discussion	Direct questions + practical experiments + daily exam + semester exam

4	3	Nucleolus - nuclear envelope - chromosome - characteristics, structure and function	The structures of nucleus	Blackboard + lecture presented in PDF format + dialogue and discussion	Direct questions + practical experiments + daily exam + semester exam
5	3	Components of nucleic acid - structure of DNA and RNA and its types, DNA extraction experiment.	Nucleic acids	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
6	3	Carbohydrates and their classification, fats and their importance, proteins and their various functions, amino acids	The main organic compounds in living organisms	Blackboard + lecture presented in PDF format + dialogue and discussion	Direct questions + practical experiments + daily exam + semester exam
7	3	Mitosis and its roles, meiosis and its roles	Cellular division	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
8	3	Definition of histology, definition of tissue, types of epithelial tissues: simple epithelial tissues and applied epithelial tissues	histology	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
9	3	Its definition and components. Classification	Connective tissue	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
10	3	Definition of blood, blood components, red blood cells, white blood cells and their classification, platelets, plasma	Blood and its components	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam

11	3	An overview of blood drawing, reasons for drawing blood, methods of drawing blood, supplies required for the blood drawing process	The process of drawing blood	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
12	3	Identifying blood types according to the ABO system and the RH system	Blood types and donation	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
13	3	Presenting methods for detecting blood types, conducting an experiment to detect blood types using the glass slide method	Detection of blood types	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam
14	3	Differential white blood cell count, PCV anemia test	Some blood tests	Blackboard + lecture presented in PDF format + practical application	Direct questions + practical experiments + daily exam + semester exam

11.Course Evaluation

- 1- Evaluation by asking direct questions to students to determine the extent of their understanding.
- 2- Evaluation through follow-up while conducting experiments and using laboratory tools and equipment.
- 3- Conduct a written exam.
- 4- Homework.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	General biology book in the college library
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Al-Rubaie, Abbas Hussein Mughir (2018) Life Sciences. Dar Al-Sadiq Cultural Foundation for Printing, Publishing and Distribution. Babylon, Iraq.
Electronic References, Websites	View scientific websites

Course Description Form

1. Course Name:	
Mathematics	
2. Course Code:	
Chem.1.5	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
10-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Name: Dr. faeda yaseen taha Al – Badri Email: faedayaseen@uosamarra.edu.iq	
8. Course Objectives	
- Introducing students to mathematics, including topics - Differentiation, integration, application, types and applications - Mathematics on it, where it deals with three parts 1- The derivative and its types 2- Definite integration and indefinite integration 3- Application and its types - In the event that the curriculum related to calculus and integration is completed, introduction to the topics of the second stage will be addressed and applications. - For students to be familiar with most of the general mathematics topics - They can benefit from it in their studies.....	
9. Teaching and Learning Strategies	
Strategy	Cognitive goals and understanding A1- Enabling students to increase their cognitive achievement in calculus A2- Enabling students to solve questions related to each topic A3- Introducing the student to the practical application of mathematics topics assigned to their grades B - Skills objectives for the course B1 - Training students to solve exercises with understanding B2 - Enabling students to apply exercises in different ways B3 - Helping students link topics to reality B4- Helping students give examples from real life for each topic C- Emotional goals: C1- Adopting the method of dialogue and discussion between the

	students and the professor C2- Assigning students to write structured reports D - General and qualifying transferable skills (skills related to employment and personal development). D1- Students' contribution and ability to work with educational and professional work teams D2- Utilizing the knowledge that students have received and promoting positive thinking D3- Enabling the student to cooperate with parties outside the university institution and train with them D4- That students be able to master the teaching profession D5- That students acquire the types of thinking skills they learned through the enrichment questions presented to them. And-thinking skills 1- Making the student interact with the lecture through actual participation with the professor by answering questions 2- Urging the student to commit to homework on a daily basis 3- Allowing the student to express his thoughts 4- Student participation and interaction with each other - Teaching and learning methods 1-Method of delivering theoretical lectures 2- Method of conclusion 3-Creative thinking method Calendar methods - 1- Daily exams 2- Monthly exams 3-Homework assignments and organized reports
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	1	Enabling the student to understand the vocabulary discussed in the lecture.	Derivative rules with applications	lecture	Daily exam and assignments
Second	1	Enabling the student to understand the vocabulary discussed in the lecture. Enabling the student to understand the vocabulary discussed in the lecture.	Derivative rules with applications	lecture	Daily exam and assignments
Third	1	Enabling the student to understand the vocabulary discussed in the lecture.	Derivative rules with applications	Lecture	Daily exam and assignments
Fourth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Derivative rules with applications	lecture	Daily exam and assignments

Fifth	1	Enabling the student to understand the vocabulary discussed in the lecture.	functions, including homology, its inverses, and hyperbolic functions	lecture	Daily exam and assignments
Sixth	1	Enabling the student to understand the vocabulary discussed in the lecture.	functions, including homology, its inverses, and hyperbolic functions	Lecture	Daily exam and assignments
Seventh	1	Enabling the student to understand the vocabulary discussed in the lecture.	functions, including homology, its inverses, and hyperbolic functions	lecture	Daily exam and assignments
Eighth	1	Enabling the student to understand the vocabulary discussed in the lecture.	functions, including homology, its inverses, and hyperbolic functions	lecture	Daily exam and assignments
Ninth	1	Enabling the student to understand the vocabulary discussed in the lecture.	functions, including homology, its inverses, and hyperbolic functions	lecture	Daily exam and assignments
tenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	Lecture	Daily exam and assignments
Eleventh	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	Lecture	Daily exam and assignments
Twelfth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	lecture	Daily exam and assignments
Thirteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	lecture	Daily exam and assignments
Fourteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	Lecture	Daily exam and assignments
Fifteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Indefinite integration and applied examples	lecture	Daily exam and assignments
Sixteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments
Seventeenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments
Eighteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments
Nineteenth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments

Twenty	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments
Twenty-first	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	lecture	Daily exam and assignments
Twenty-second	1	Enabling the student to understand the vocabulary discussed in the lecture.	Integration methods	Lecture	Daily exam and assignments
Twenty-third	1	Enabling the student to understand the vocabulary discussed in the lecture.	Practical examples of integration for all the mentioned types	lecture	Daily exam and assignments
Twenty-fourth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Practical examples of integration for all the mentioned types	lecture	Daily exam and assignments
Twenty-fifth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Practical examples of integration for all the mentioned types	lecture	Daily exam and assignments
Twenty-sixth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Practical examples of integration for all the mentioned types	lecture	Daily exam and assignments
Twenty-seventh	1	Enabling the student to understand the vocabulary discussed in the lecture.	Principles Statistics	lecture	Daily exam and assignments
Twenty-eighth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Principles Statistics	lecture	Daily exam and assignments
Twenty-ninth	1	Enabling the student to understand the vocabulary discussed in the lecture.	Principles Statistics	lecture	Daily exam and assignments
Thirty	1	Enabling the student to understand the vocabulary discussed in the lecture.	Principles Statistics	Lecture	Daily exam and assignments

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)	Calculus 2009 مع اعداد منهج من قبل التدريسية
Main references (sources)	THOMAS & CALCULUSE
Recommended books and references (scientific journals, reports...)	Books of free education about calculus for the world Thomas
Electronic References, Websites	Book websites, mathematics forums, educational YouTube And the websites of colleges of education

Course Description Form

1. Course Name :					
Chemical safety and security / first class					
2. Course Code :					
chem.1.8.					
3. Semester / Year :					
year					
4. Description Preparation Date :					
19/1/2026					
5. Available Attendance Forms :					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
30 hours / 2 units					
7. Course administrator's name (mention all, if more than one name)					
Name : HUDA MUTAR IBRAHIM Email : Huda.mutar@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives		- Protecting workers in chemical laboratories and - chemical stores from health risks and dangers - related to the use of chemicals. - Protecting society and the environment. - Reducing the possibility of using or transferring - dangerous or toxic chemicals that an individual - could misuse to harm others.			
9. Teaching and Learning Strategies					
Strategy		Lectures and adopting educational discussion, Awareness and educational vi to chemical laboratories and conducting some exercises related to chemi safety and others.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theoretical lecture	Introduction and definitions, chemical safety and security laws and legislation	Introduction to the course	Lecture and discussion	Examinations
2	1 Theoretical lecture	roles and responsibilities, safety committee and chemical security, environmental health and safety office	Introduction to the course	Lecture and discussion	Examinations

3	1 Theoretical Lecture	Introduction, Managing and Assessment the risks, Assessment the physical and biological risks	Assessment risks and hazards within the laboratory	Lecture and discussion	Examinations
4	1 Theoretical Lecture	Assessment the toxicological risks for materials chemicals	Assessment risks and hazards within the laboratory	Lecture and discussion	Examinations
5	1 Theoretical Lecture	Assessment the risks of flammable, reactive and explosive materials in laboratory	Assessment risks and hazards within the laboratory	Lecture and discussion	Examinations
6	1 Practical exercise	Assessment Risks in the chemical laboratory	Assessment risks and hazards within the laboratory	Lecture and discussion + Laboratory	Examinations
7	1 Theoretical Lecture	Introduction, basic administrative controls	Chemical safety	Lecture and discussion	Examinations
8	1 Theoretical Lecture	Safety equipment Personal, safety equipment laboratory, how to work safely in the laboratory	Chemical safety	Lecture and discussion	Examinations
9	1 Theoretical Lecture	Implementing and applying laboratory safety rules, who is responsible for laboratory safety? reporting and investigating accidents	Chemical safety	Lecture and discussion	Examinations
10	1 Laboratory visit	know about laboratory safety equipment	Chemical safety	Lecture and discussion + Laboratory	Examinations
11	1 Practical exercise	know about Personal safety equipment and applying laboratory safety rules	Chemical safety	Lecture and discussion + Laboratory	Examinations
12	1 Theoretical Lecture	Introduction, definition of chemical waste and its risks, collection and storage of chemical waste	Chemical waste management	Lecture and discussion	Examinations
13	1 Theoretical Lecture	Treatment and risk Reduction, disposal options from chemical waste	Chemical waste management	Lecture and discussion	Examinations
14	1 Theoretical Lecture	Introduction, the basics of security, developing a security plan and adhering to rules	Laboratory security	Lecture and discussion	Examinations

15	1 Laboratory visit	Conducting assessments of potential security risks, determining security levels	Laboratory security	Lecture and discussion + Laboratory	Examinations
16	1 Theoretical Lecture	How do we keep our Progress forward and ensure our culture changes towards laboratory safety and security	Sustainability and Culture	Lecture and discussion	Examinations
17	1 Theoretical Lecture	Introduction, careful Planning, general Procedures for dealing with biological materials	Working using chemicals	Lecture and discussion	Examinations
18	1 Theoretical Lecture	General Procedures for dealing with highly toxic chemicals materials	Working using chemicals	Lecture and discussion	Examinations
19	1 Theoretical Lecture	General Procedures for dealing with hazardous chemicals materials	Working using chemicals	Lecture and discussion	Examinations
20	1 Theoretical Lecture	General Procedures for dealing with hazardous chemicals materials	Working using chemicals	Lecture and discussion	Examinations
21	1 Laboratory visit	know general Procedures for dealing with chemicals materials	Working using chemicals	Lecture and discussion + Laboratory	Examinations
22	1 Theoretical Lecture	Introduction, dealing with devices powered by electricity energy, compressed gases	working using laboratory apparatuses	Lecture and discussion	Examinations
23	1 Theoretical Lecture	Dealing with high and low pressures and temperatures	working using laboratory apparatuses	Lecture and discussion	Examinations
24	1 Practical exercise	Know devices powered by electricity energy	working using laboratory apparatuses	Lecture and discussion + Laboratory	Examinations
25	1 Theoretical Lecture	Introduction, clean chemistry for all laboratories, transport and ship chemicals materials	Chemicals management	Lecture and discussion	Examinations
26	1 Theoretical Lecture	Purchase chemicals materials, inventory chemicals materials	Chemicals management	Lecture and discussion	Examinations
27	1 Laboratory visit	Knowing how to store chemicals materials	Chemicals management	Lecture and	Examinations

				discussion + Laboratory	
28	1 Theoretical Lecture	Introduction, emergency preparedness plan, assess laboratory weaknesses,	Emergency plans	Lecture and discussion	Examinations
29	1 Theoretical Lecture	Creating an emergency plan, determine leadership and priorities	Emergency plans	Lecture and discussion	Examinations
30	1 Practical exercise	Emergency training	Emergency plans	Lecture and discussion + Laboratory	Examinations
11. Course Evaluation					
- Daily exam + first semester exam (25 degree) - Daily exam + second semester exam (25 degree) - final exam (50 degree)					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Security and safety of the chemical laboratory Guide to prudent chemical management Lisa Moran and Tina Masciangioli		
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1. Course Name:	General Arabic/ first Stage
2. Course Code:	Chem.1.10
3. Semester / Year:	year
4. Description Preparation Date:	2024/12/11
5. Available Attendance Forms:	weekly
6. Number of Credit Hours (Total) / Number of Units (Total)	30 hour / 2 units

7. Course administrator's name (mention all, if more than one name)

Name: Assistant Professor: Ahmed Hamed Khaled Email: ahmed.h.khalid@uosamarra.edu.iq

8. Course Objectives

Encourage students to learn the correct pronunciation of letters.
Encourage students to understand the rules of the Arabic language.
Define correct spelling in accordance with modern spelling rules.
Teaching students about noun and verb markers.
How to parse and understand meaning.
Learn punctuation.

9. Teaching and Learning Strategies

Strategy	Working to refine students' minds, develop their skills and direct them in an academic and scientific manner based on developing a positive spirit by enhancing confidence in individual and collective skills using scientific means directed towards students through scientific participation and skill-based activities through seminars, discussion groups and attending discussions to benefit from the experiences of seniors, and working to achieve academic and scientific goals and clarify them to students, in addition to using learning tools for clarification, such as: the blackboard, the display screen, and clippings, and encouraging students to visit libraries and how to access information in a short time.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	1	Theoretical	Speech and its parts	Discussion and presentation	Written or oral tests
Second	1	Theoretical	Name tags	Discussion and presentation	Written or oral tests
Third	1	Theoretical	Verb signs	Discussion and presentation	Written or oral tests
Fourth	1	Theoretical	)The inflected and the uninflected(The inflected and the uninflected nouns	Discussion and presentation	Written or oral tests
Fifth	1	Theoretical	The inflected and the uninflected verbs	Discussion and presentation	Written or oral tests
Sixth	1	Theoretical	The inflected and the uninflected verbs	Discussion and presentation	Written or oral tests
Seventh			exam		monthly exam
Eighth	1	Theoretical	Parsing of the sound masculine plural and its annex	Discussion and presentation	Written or oral tests

Ninth	1	Theoretical	Hamzat al-Qat' and al-Wasl	Discussion and presentation	Written or oral tests
tenth	1	Theoretical	Parsing of the sound feminine plural and its annexes	Discussion and presentation	Written or oral tests
Eleventh	1	Theoretical	Ta and Ha at the end of the word	Discussion and presentation	Written or oral tests
Twelfth	1	Theoretical	Parsing of the indeclinable	Discussion and presentation	Written or oral tests
Thirteenth	1	Theoretical	The parsing of the five nouns	Discussion and presentation	Written or oral tests
Fourteenth	1	Theoretical	Parsing of the five verbs	Discussion and presentation	Written or oral tests
Fifteenth	1	Theoretical	Defective nouns	Discussion and presentation	Written or oral tests
Sixteenth	1	Theoretical	Parsing of weak verbs	Discussion and presentation	Written or oral tests
Seventeenth			Mid-year holiday		
Eighteenth			Mid-year holiday		
Nineteenth	1	Theoretical	Arabic calligraphy: definition and types	Discussion and presentation	Written or oral tests
Twenty	1	Theoretical	Alphabetical and alphabetical sequence of Arabic letters	Discussion and presentation	Written or oral tests
Twenty-first	1	Theoretical	The phonetic sequence of Arabic letters	Discussion and presentation	Written or oral tests
Twenty-second	1	Theoretical	Audio and written clip	Discussion and presentation	Written or oral tests
Twenty-third	1	Theoretical	Movement, extension, tanween and emphasis	Discussion and presentation	Written or oral tests
Twenty-fourth			exam		monthly exam
Twenty-fifth	1	Theoretical	Letter segment Solar and lunar letters	Discussion and presentation	Written or oral tests
Twenty-sixth	1	Theoretical	Surah Yusuf (20) Verse	Discussion and presentation	Written or oral tests
Twenty-seventh	1	Theoretical	(The Wonderful Ruby) from the book One Thousand and One Nights	Discussion and presentation	Written or oral tests
Twenty-eighth	1	Theoretical	Poem (Strangers) by Nazik Al-Malaika	Discussion and presentation	Written or oral tests
Twenty-ninth	1	Theoretical	Poem (Optimism) by Ibrahim Touqan	Discussion and presentation	Written or oral tests
Thirty	1	Theoretical	punctuation marks	Discussion and presentation	Written or oral tests

11. Course Evaluation

- Daily exam + first month exam 25 points
- Daily exam + second month exam 25 points
- Final exam 50 marks

12. Daily exam + first month exam 25 points

Required textbooks (curricular books, if any)	Comprehensive Grammar by Dr. Abbas Hassan. Applied Grammar by Dr. Abdo Al Rajhi. The Science of Arabic Writing by Dr. Ghanem Qaddouri Al-Hamad. Clear Spelling by Abdul Majeed Al-Naimi and Daham Al-Kayali.
Main references (sources)	The Collection of Arabic Lessons, by Mustafa Al-Ghalayini. Explanation of Shudhur Al-Dhahab by Ibn Hisham.
Recommended books and references (scientific journals, reports...)	Iraqi Scientific Academy Linguistic Dictionaries All Journals Concerning the Arabic Language
Electronic References, Websites	All websites and social media accounts that deal with the Arabic language

Second stage

Course Description Form

1. Course name					
Organic chemistry					
2. Course code					
Chem.2.1.					
3. semester/year					
annual					
4. Date of preparation of this description					
10 -12 -2025					
5. Available attendance forms					
weekly					
6. Number of study hours)total(/ Number of units)total(					
7/60					
7. Course Instructor Name					
Name: dr.Diana Adul Karim Shaker			Email: deyana.abd@uosamarra.edu.iq		
Name: Asst. lect. Rasha Threer Tariq			Email Rashatt4990@gmail.com		
8. Course objectives					
Definition the importance and uses of organic compounds in daily life, the most prominent of which are medicines. Explaining and clarifying what organic chemistry is and explaining its origins and importance			Link chemistry to daily life as much as possible and its impact growing in industry, agriculture, cosmetics and other fields. Keeping pace with development in all areas of life, as the basis that that It lies in knowing the composition and properties of matter.		
9. Teaching and learning strategies					
Strategy		The main strategy to be followed in delivering the course is to encourage student participation while simultaneously refining and expanding their thinking skills . This will be achieved through interactive classes and lessons, and through the use of simple trative laboratory experiments involving some activities . Modern illus .teaching aids will also be used			
10. Course structure					
Evaluation method	Learning method	Name of unit or topic	Required learning outcomes	watches	week
Weekly and semester tests	Lecture and discussion + laboratory	Alcohols	-Nomenclature -Classification Properties Physical Industrial sources of alcohol	2 theoretica 1 + 3 practical	the first
Weekly and semester tests	Lecture and discussion + laboratory	Alcohols	and -Mono polyhydroxy alcohols	2 theoretica 1 + 3 practical	the second
Weekly and semester tests	Lecture and discussion + laboratory	Alcohols	Preparation of alcohols Monotheism Alcohol interactions	2 theoretica 1 + 3 practical	the third
Weekly and	Lecture and	Ethers Epoxides	-Nomenclature	2	Fourth

semester tests	discussion + laboratory		Physical Properties ethers Preparation of	theoretical 1 + 3 practical	
Weekly and semester tests	Lecture and discussion + laboratory	Ethers Epoxides	Ether reactions Preparation of epoxides	2 theoretical 1 + 3 practical	Fifth
Weekly and semester tests	Lecture and discussion + laboratory	Ethers Epoxides	Interactions Epoxides	2 theoretical 1 + 3 practical	Sixth
Weekly and semester tests	and Lecture discussion + laboratory	Aldehydes and ketones	Physical -Structure Aldehyde -Properties Compounds and ketones	2 theoretical 1 + 3 practical	Seventh
Weekly and semester tests	Lecture and discussion + laboratory	Aldehydes and ketones	Aldehyde preparation and ketones Aldehyde reactions and ketones	2 theoretical 1 + 3 practical	The eighth
Weekly and semester tests	Lecture and discussion + laboratory	Aldehydes and ketones	Addition Nucleophilic For the double bond at the carbonyl Classification of carbonyl derivatives	2 theoretical 1 + 3 practical	Ninth
Weekly and semester tests	Lecture and discussion + laboratory	Aldehydes and ketones	hydrogen-alpha acidity Condensation reactions with mechanics	2 theoretical 1 + 3 practical	tenth
Weekly and semester tests	Lecture and discussion + laboratory	acids carboxylic	Physical -Structure -properties Salts -Nomenclature of carboxylic acids	2 theoretical 1 + 3 practical	eleventh
Weekly and semester tests	Lecture and discussion + laboratory	carboxylic acids	Industrial sources carboxylic acids	2 theoretical 1 + 3 practical	twelfth
Weekly and semester tests	Lecture and discussion + laboratory	carboxylic acids	Carboxylic acid reactions dicarboxylic acids	1 theoretical 1 + 3 practical	thirteenth
Weekly and semester tests	and Lecture discussion + laboratory	carboxylic acid derivatives	-Composition -Physical Properties Nomenclature	2 theoretical 1 + 3 practical	fourteenth
Weekly and semester tests	Lecture and discussion + laboratory	carboxylic acid derivatives	Types of derivatives carboxylic acid derivatives	2 theoretical 1 + 3 practical	fifteenth
Weekly and semester tests	Lecture and discussion + laboratory	carboxylic acid derivatives	carboxylic acid derivatives	2 theoretical 3 + 1 practical	sixteenth
Weekly and semester tests	Lecture and discussion + laboratory	carboxylic acid derivatives	Completing reactions of carboxylic acid derivatives	2 theoretical 1 + 3	seventeenth

				practical	
Weekly and semester tests	Lecture and discussion + laboratory	Amines and diazonium salts	-Structure -Classification Nomenclature -Physical properties amine salts Industrial sources	2 theoretical + 3 practical	eighteenth
Weekly and semester tests	Dialogue lecture and discussion	Amines and diazonium salts	amine compounds basicity of amines Amine reactions (substitution)	2 theoretical	nineteenth
Weekly and semester tests	Dialogue lecture and discussion	Amines and diazonium salts	Reaction with nitrous acid diazonium salts Coupling reactions using diazonium salts	2 theoretical	Twenty
Weekly and semester tests	Dialogue lecture and discussion	Phenols	General formula and physical -structure properties Sources of phenols	2 theoretical	-twenty one
Weekly and semester tests	Dialogue lecture and discussion	Phenols	Preparation of phenols Phenol reactions	2 theoretical	-twenty second
Weekly and semester tests	Dialogue lecture and discussion	Aryl halides	General formula and physical-structure properties	2 theoretical	-twenty third
Weekly and semester tests	Dialogue lecture and discussion	Aryl halides	Preparation of aryl halides	2 theoretical	-twenty fourth
Weekly and semester tests	Dialogue lecture and discussion	Aryl halides	Reactions of aryl halides	2 theoretical	-twenty fifth
Weekly and semester tests	Dialogue lecture and discussion	organosulfur compounds	-Composition -Physical Properties Preparation Methods	2 theoretical	-twenty sixth
Weekly and semester tests	Dialogue lecture and discussion	organosulfur compounds	of Reactions organosulfur compounds	2 theoretical	-twenty seventh
and Weekly semester tests	Dialogue lecture and discussion	organosulfur compounds	Sulfonic properties	2 theoretical	-twenty eighth
Weekly and semester tests	Dialogue lecture and discussion	organophosphorus compounds	Types of organophosphorus compounds	2 theoretical	-twenty ninth
Weekly and semester tests	Dialogue lecture and discussion	organophosphorus compounds	Methods for preparing organophosphorus compounds	2 theoretical	thirty
11. Course evaluation					
- semester exams 60 - Weekly Exams 20 - Reports 10 - Featured Posts 10					
12. Learning and teaching resources					

ORGANIC CHEMISTRY By Robert Thornton Morrison and Robert Neilson Boyd ORGANIC CHEMISTRY By Graham Solomons	(Required textbooks (methodology if any
Organic Chemistry by Dr. Muhammad Nizar College -Department of Chemistry -Ibrahim University of Mosul -of Education Reactions, by Dr. Mechanism of Organic Khaled Mahmoud Daoud , Department of Chemistry, College of Education, University of Mosul	(Main References (Sources
VOGEL S Textbook of PRACTICAL ORGANIC CHEMISTRY Organic Chemistry by Paula Yurkanis Bruice :Iraqi Academic Journal https://www.iasj.ne	Recommended supporting books and (.references (scientific journals, reports, etc
https://2u.pw/3oWYspkg https://t.me/organicbook	Electronic references, websites

Course Description Form

1. Course Name:	organic chemistry laboratory / second stage			
2. Course Code:	Chem 2.1.P.			
3. Semester / Year:	Year			
4. Description Preparation Date:	10/12/2025			
5. Available Attendance Forms:	Weekly			
6. Number of Credit Hours (Total) / Number of Units (Total)	7/90			
7. Course administrator's name (mention all, if more than one name)	Name: rasha tahreer tariq Email: rasha.ta.t@uosamarra.edu.iq Name : jasim ahmed hasan Email: jasim.ahmed@uosamarra.edu.iq			
8. Course Objectives	<table> <tr> <td>Course Objectives</td> <td>Developing students' ability in the following areas: 1-The student learns how to use laboratory equipment and how to deal</td> </tr> </table>		Course Objectives	Developing students' ability in the following areas: 1-The student learns how to use laboratory equipment and how to deal
Course Objectives	Developing students' ability in the following areas: 1-The student learns how to use laboratory equipment and how to deal			

	with it 2-Knowledge of glass tools, how to connect them, and the purpose of using each device. 3-Knowledge of percentage calculations for practical experiments. 4-The student learns how to link the theoretical formula of organic chemistry with practical application.
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9. Teaching and Learning Strategies

Strategy	The student's knowledge of the raw materials for greening, chemicals of physiological importance and industrial importance 2- The student's knowledge of the chemicals used and the safe way to deal with them. 3-The student will master percentage calculations to calculate the percentage of prepared materials by weighing the starting material for solid materials and relying on the density law for liquid materials. 4- The student will learn how to search for external sources, for example books, theses, and official reports issued by international organizations and other sources.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2Practical	Calculate percentage	Preparation of nitrobenzene	Lecture with practical application	The exams
Second	2Practical	Calculate percentage	Preparation of aspirin	Lecture with practical application	The exams
Third	2Practical	Aspirin purification	Recrystallization of aspirin	Lecture with practical application	The exams
Fourth	2Practical	Calculate percentage)	Preparation of acetanilide	Lecture with practical application	The exams
Fifth	2Practical	Calculate percentage	Oxidation of toluene	Lecture with dialogue and discussion	The exams
Sixth	2Practical	Calculate percentage	Preparation of benzoic acid	Lecture with practical application	The exams
Seventh	2Practical	Calculate percentage	Preparation of 1,5-hexadiene	Lecture with dialogue and discussion	The exams

Eighth	2Practical	Calculate percentage	Preparation of p-bromoacetanilide	Lecture with practical application	The exams
Ninth	2Practical	The importance of esters and their uses in the industrial field	Esters	Lecture with dialogue and discussion	The exams
tenth	2Practical	Preparation of soap	Preparation of Stearic acid salt	Lecture with practical application	The exams
Eleventh	2Practical	The harms and benefits of caffeine and how to extract it	Extraction of caffeine from tea	Lecture with practical application	The exams
Twelfth	2Practical	Calculate percentage	Canizaro reaction	Lecture with practical application	The exams
Thirteen	2Practical	Calculate percentage	Preparation of malic and fumaric acid	Lecture with practical application	The exams
Fourteen	2Practical	Detection of carboxylic acids and esters	Some important reagent	Lecture with dialogue and discussion	The exams
Fifteenth	2Practical	Calculate percentage	Condensation aldol	Lecture with practical application	The exams
Sixteen	2Practical	Calculate percentage	Perkin reaction	Lecture with practical application	The exams
Seventeen	2Practical	Calculate percentage	Diels-alder reaction	Lecture with practical application	The exams
Eighteen	2Practical	Calculate percentage	Preparation of oxime	Lecture with practical application	The exams
Nineteen	2Practical	Calculate percentage	Preparation of methyl benzoate	Lecture with practical application	The exams
Twenty	2Practical	Calculate percentage	Preparation of acetaldehyde	Lecture with practical application	The exams
Twenty-first	2Practical	Differentiation between Aldehydic and Ketonic	Scientific detection of aldehydes and ketones	Lecture with practical application	The exams

		Compounds			
Twenty-second	2Practical	Calculate percentage	Preparation of cyclohexanone	Lecture with practical application	The exams
Twenty-third	2Practical	Distinguishing between Primary, Secondary, and Tertiary Alcohols	Detection of alcohols	Lecture with practical application	The exams
Twenty-fourth	2Practical	Calculate percentage	Preparation of succinic anhydride	Lecture with practical application	The exams
11. Course Evaluation					
Attendance + Reports + First Semester Exam 7.5					
Attendance + Reports + second Semester Exam 7.5					
Final Exam 15					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Organic Chemistry / Authored by Morrison and Boyd		
			Organic Chemistry / Authored by Dr. Mohammed Nazar Ibrahim – College of Education – University of Mosul		
Electronic References, Websites			J. Clayden, N. Greeves & S. Warren "Organic Chemistry" (Oxford University Press, 2012), pp. 1-15		

Course Description Form

1. Course Name:	Inorganic chemistry - second stage
2. Course Code:	Chem.2.2.
3. Semester / Year:	annual
4. Description Preparation Date:	20/1/2026
5. Available Attendance Forms:	

weekly	
6. Number of Credit Hours (Total) /	
(150 hours) (2 theoretical hours + 2 practical hours)/7	
7. Course administrator's name (mention all, if more than one name)	
Name: Miami Huseen Ali Email: miami.hu.ali@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	• Learn about the periodic table • Methods of preparing elements • Study general properties and interactions
9. Teaching and Learning Strategies	
Strategy	Enables the student to obtain knowledge of the periodic table The student's knowledge of the basic concepts of the distribution of elements in the periodic table. The student's knowledge of the groups and periods of the periodic table The student's knowledge of the elements, properties, and reactions of the periodic table The student will learn to prepare many of the periodic table elements and compounds

10. Course Structure

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Hours	The week
Weekly and monthly exams And laboratory reports	The lecture	The periodic table and its general properties	Elements of the periodic table	2	1
Weekly and monthly exams And laboratory reports	The lecture	How the elements are distributed in the periodic table	Elements of the periodic table	2	2
Weekly and monthly exams And laboratory reports	The lecture	Hydrogen (introduction, preparation)binoculars and photographs	Hydrogen	2	3
Weekly and monthly exams And laboratory reports	The lecture	Hydrogen bonds, their types, and acids	hydrogen bond	2	4
Weekly and monthly exams And laboratory reports	The lecture	hybridization	hybridization	2	5
Exam		Exam	Exam	2	6

Weekly and monthly exams And laboratory reports	The lecture	The elements of the first group, their presence and distribution, and their properties	First group elements	2	7
Weekly and monthly exams And laboratory reports	The lecture	Preparation and vehicles of the first group	First group elements	2	8
Weekly and monthly exams And laboratory reports	The lecture	The elements of the second group, their existence and properties	Elements of the second group	2	9
Weekly and monthly exams And laboratory reports	The lecture	Some elements of the second group, their preparation	Elements of the second group	2	10
Weekly and monthly exams And laboratory reports	The lecture	The elements of the third group, their presence and methods of preparation	Elements of the third group	2	11
Weekly and monthly exams And laboratory reports	The lecture	Boron, its compounds, and its importance	Elements of the third group	2	12
Weekly and monthly exams And laboratory reports	The lecture	Aluminum, its compounds and their importance	Elements of the third group	2	13
Weekly and monthly exams And laboratory reports	The lecture		Exam	2	14
Weekly and monthly exams And laboratory reports	The lecture	Group IV elements, carbon, its isotopes, and their reactions	Elements of the fourth group	2	15
			half year holiday		16
Weekly and monthly exams And laboratory reports	The lecture	Silicon and its compounds and their importance with the rest of the elements	Silicon	2	17
Weekly and monthly exams And laboratory reports	The lecture	Introduction to the elements of the fifth group	Elements of the fifth group	2	18
Weekly and monthly exams And laboratory reports	The lecture	Nitrogen, its importance, its compounds, and methods of preparing it	Elements of the fifth group	2	19
Weekly and monthly exams	The lecture	Phosphorus, its compounds, and methods	Elements of the fifth group	2	20

And laboratory reports		of preparation			
Weekly and monthly exams And laboratory reports	The lecture	Group 6 elements: Oxygen and its diffusion	Elements of the sixth group	2	21
Weekly and monthly exams And laboratory reports	The lecture	Oxygen compounds, their importance and methods of preparation	Elements of the sixth group	2	22
	The lecture	Sulfur, its compounds, and methods of preparation	Elements of the sixth group	2	23
Weekly and monthly exams And laboratory reports	The lecture	The rest of the members of the sixth group	Elements of the sixth group	2	24
Weekly and monthly exams And laboratory reports	The lecture	The seventh group (Halogens)	Elements of the seventh group	2	25
		Exam	Exam	2	26

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

1-Oral exams

2- Monthly exams

3- Annual exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Dr. Mahdi Naji Zakum - Chemistry of Representative Elements - University Publications Basra, Iraq. 1988 - Dr. Numan Al-Naimi and his group - Part Two F. Cotton, J. Wilkinson, Basic Inorganic Chemistry, translated by Dr. Mahdi Al-Zakum, Basra University Publications, Iraq 1988
Main references (sources)	
Recommended books and references (scientific journals, reports...)	- Basic Inorganic Chemistry, F.A.Cotton, G. Wilkinson and P.L.Gaus, 3rd edition, John Wiley and Sons, Inc. New York, 1995.
Electronic References, Websites	James E.House, inorganic chemistry, copyright2008, Elsevier inc. - Textbook:, Concepts & Models of Inorganic Chemistry, 2nd edition, Wiley,New 2009

Course Description Form

1. Course Name:					
Analytical Chemistry Second stage					
2. Course Code:					
Chem.2.3					
3. Semester / Year:					
Annual for the Academic Year 2024/2025					
4. Description Preparation Date:					
2025/12/23					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hours / 7units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr . Baidaa Adnan Jassim			Email: baidaa9227@gmail.com		
Name: Madyan Adnan Yaseen			Email: Madyan.yaseen@my.jcu.edu.au		
8. Course Objectives					
This course consists of two sections: The first section aims to provide the student with the basic principles of quantitative gravimetric analysis, including the conditions for the formation of sediments, factors affecting the formation and pollution of sediments, types of sedimentation factors and applications related to gravimetric analysis.			In the second section, the student will learn about the techniques of chemical separation methods, including solvent extraction, the foundations of chromatography and its types, and the initial principles of ion exchange. Finally, clarify the statistical treatments of the results of the analysis. This course is also important in the study of some subsequent courses such as theoretical analysis (3)..		
9. Teaching and Learning Strategies					
Strategy	- Interactive Lecture - Discussion - Brainstorming - Problem & solving - Simulations and demonstrations - Projects, tasks and costs - Self-learning - Cooperative Learning - Peer Learning				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	6	Learn about the methods of quantitative gravimetric analysis, its steps, and methods of conducting calculations	Quantitative Gravimetric Analysis Methods	Tasks, Dialogue and discussion Problem solving	Assignment (problem solving) and quizzes
4-5	4	Identify sedimentation	Some theoretical	Brainstorming	Assignment

		methods of homogeneous solutions, causes of precipitate contamination and types of Precipitates.	foundations of the sedimentation process	Tasks, Dialogue, and discussion	(problem solving) and quizzes
6-8	7	Explains why the sediment occurs or not using the values of the solubility constant.	Factors affecting sediment solubility	Interactive Lecture Dialogue and Discussion	Assignment (problem solving) and quizzes
9-10	4	Chemical composition of sediments Gravimetric coefficient Quantitative analytical calculations	Sediment types and conditions Configured	Brainstorming Tasks, Dialogue, and discussion	Oral exam
11-13	7	Minutes and their growth - relative supersaturation state - stages of precipitate formation - the nature of the precipitate and the size of the crystals formed Colloidal state and colloidal sediment agglomeration process Sedimentation from homogeneous solutions - sediment contamination and its types Avoid sediment contamination and treatment methods Precipitate digestion process - Precipitate washing - Re-sedimentation process -	Crystalline composition of sediments	Interactive Lecture Dialogue and Discussion	Short exam Semester exam
14-16	6	Distribution coefficient - distribution ratio Percentage of extraction Separation efficiency and factors affecting it Adsorption - Distribution - Distribution Coefficient	Solvent extraction separation methods	Tasks, Dialogue and discussion Problem solving	Assignment , duties (problem solving) and quizzes
17-22	12	Identify the types of chromatography: Column chromatography •Paper chromatography and applications • Thin layer chromatography •Gel filtration chromatography Gas chromatography General principles	Classification of chromatography methods	Interactive Lecture Dialogue and Discussion	Short exam
23-25	6	Properties of ion exchangers Selectivity and selectivity coefficient, applications	Ion exchange General Foundations	Peer Lecture Dialogue and Discussion	Short exam
26-30	8	Sources of errors Accuracy and compatibility Standard deviation Coefficient of variation	Statistical treatments of the results of the analysis	Interactive Lecture Dialogue and Discussion	Assignment (problem solving) and exams

		Test T - Test F - Test Q Mathematical problems in the treatment of statistical results.			
11. Course Evaluation					
- Assignments, assignments and attendance 10% - Quizzes First Semester 2.5% - Theoretical exam first semester 10% - Practical test first semester 7.5% - Quizzes Second Semester 2.5% - Theoretical exam second semester 10% - Practical exam second semester 7.5% - Theoretical exam at the end of the year 35% - Final practical exam year 15% - Total 100%					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)					
Main references (sources)			• Harvey, D. (2000). Modern Analytical Chemistry, McGraw-Hill Companies, United States of America. • D.A.Skoog, F. J. Holler and S.R.Crouch (2007), Analytical Chemistry: An Introduction, 8th edn, Cengage Learning, California. • أسس الكيمياء التحليلية تأليف د. مؤيد العبادي و د. ثابت سعيد الغبشة • الكيمياء التحليلية الجزء الأول الأسس العامة للتحليل المرعب الكمي الوزني تأليف د. صفاء طرق الفصل في التحليل الكيميائي د. البرتين حبوش 1983 • مدخل إلى تقنيات الفصل في الكيمياء د. سمير عبد الرحيم و د. ثابت الغبشة 1985 • التحليل الكيميائي الآلي د. عبد المحسن الحيدري 1992		
Recommended books and references (scientific journals, reports...)			Harris, Daniel C. <i>Quantitative Chemical Analysis</i> . 7th ed. W. H. Freeman, 2007		
Electronic References, Websites			Home - Chemistry LibreTexts https://www.rsc.org/ https://www.chemistryworld.com/		

Course Description Form

1. Course Name:

Practical analytical chemistry/ second stage					
2. Course Code:					
Chem.2.3.P					
3. Semester / Year: Annual					
2025-2026 year					
4. Description Preparation Date:					
10/12/2025					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
90 / 7 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Baidaa Adnan Jassim			Email: baidaa9227@gmail.com		
Name: Suha Abdullah Hussein			Email: suha.al.hdaad@gmail.com		
8. Course Objectives					
Course Objectives		• Study of quantitative and gravimetric analysis • Know how to calculate the Percentage of sediment • Study direct and indirect Separation methods • Applying experiments Practically			
9. Teaching and Learning Strategies					
Strategy		Lectures and use of laboratory materials and equipment			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	Gravimetric factor	Introduction to Analytical chemistry	Laboratory	Examinations, Monthly and Weekly and reports
2	2 hours	Water of hydration	Determination of Water hydration In BaCl ₂ .2H ₂ O	Laboratory	Examinations, Monthly and Weekly and reports
3	2 hours	Quantitative Gravimetric analysis	Determination of Chloride as Silver chloride	Laboratory	Examinations, Monthly and Weekly and reports
4	2 hours	Quantitative Gravimetric analysis	Determination of Sulphate as Barium sulphate	Laboratory	Examinations, Monthly and Weekly and reports
5	2 hours	Quantitative Gravimetric analysis	Determination of Calcium as calcium oxalate	Laboratory	Examinations, Monthly and Weekly and reports
6	2 hours	examination	examination	Laboratory	Examinations, Monthly and Weekly and reports
7	2 hours	Quantitative Gravimetric analysis	Determination of Calcium as calcium carbonate	Laboratory	Examinations, Monthly and Weekly and reports
8	2 hours	Quantitative Gravimetric analysis	Determination of Calcium as calcium Oxide	Laboratory	Examinations, Monthly and Weekly and reports
9	2 hours	Colloidal solution	Determination of Iron as ferric oxide	Laboratory	Examinations, Monthly and Weekly and reports
10	2 hours	Colloidal	Determination of	Laboratory	Examinations, Monthly

		solution	Aluminum as Aluminum oxide		and Weekly and reports
11	2 hours	Quantitative Gravimetric Analysis	Determination of Nickel as dimethyl Glyoxime ⁰ complex	Laboratory	Examinations, Monthly and Weekly and reports
12	2 hours	Percentage	Examples	Laboratory	Examinations, Monthly and Weekly and reports
13		Half year holiday	Half year holiday		Examinations, Monthly and Weekly and reports
14		Half year holiday	Half year holiday		Examinations, Monthly and Weekly and reports
15	2 hours	Examination	Examination	Laboratory	Examinations, Monthly and Weekly and reports
16	2 hours	Separation methods	Introduction of Separation methods	Laboratory	Examinations, Monthly and Weekly and reports
17	2 hours	Separation By precipitation (direct)	Separation iron To Aluminum by precipitation	Laboratory	Examinations, Monthly and Weekly and reports
18	2 hours	Separation By extraction (indirect)	Introduction of Solvent extraction	Laboratory	Examinations, Monthly and Weekly and reports
19	2 hours	extraction	Iodine distribution Between organic Solvent and water	Laboratory	Examinations, Monthly and Weekly and reports
20	2 hours	Examination	Examination	Laboratory	Examinations, Monthly and Weekly and reports
21	2 hours	Ion exchange	Introduction of Ion exchange	Laboratory	Examinations, Monthly and Weekly and reports
22	2 hours	Ion exchange	Calculate the Capacity of cationic exchanger	Laboratory	Examinations, Monthly and Weekly and reports
23	2 hours	Ion exchange	Determination of Total cations in water	Laboratory	Examinations, Monthly and Weekly and reports
24	2 hours	Separation (indirect)	Separation and Determination of Zinc and Mg by Ion exchange	Laboratory	Examinations, Monthly and Weekly and reports
25	2 hours	Separation (indirect)	Separation of Chloride from Bromide by on Anion exchanger	Laboratory	Examinations, Monthly and Weekly and reports
26	2 hours	Chromatography	Introduction of Chromatography	Laboratory	Examinations, Monthly and Weekly and reports
27	2 hours	Separation (indirect)	Separation of Some amino acids By paper Chromatography	Laboratory	Examinations, Monthly and Weekly and reports
28	2 hours	Separation (indirect)	Separation of Some a mixture Indicators By PaperChromatography	Laboratory	Examinations, Monthly and Weekly and reports

11. Course Evaluation

- Monthly exams	35%
- Daily exams	10%
- Reports	5%
- Final exam	50%
- Total	100%
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Analytical chemistry , part 1 and Introduction to Analytical chemistry , Part 2 , written by Dr. Safaa Razouk Al-mureib
Main references (sources)	Fundamentals of Analytical chemistry , Dr. Mouayed Q. Al-Abachi and Dr. Thabit S. Al-Ghabsha
Recommended books and references (scientific journals, reports...)	Theoretical and Practical fundamentals Gravimetric analysis chemistry by Dr. Dakhil Nassir Taha
Electronic References, Websites	

Course Description Form

1. Course Name:	
Physical Chemistry / Second Stage	
2. Course Code:	
Chem.3.4	
3. Semester / Year:	
year	
4. Description Preparation Date:	
11/12/2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 9 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Lecturer Noor Saddam Abdulhadi	
8. Course Objectives	
1. To introduce students to the basic concepts of gases and their properties, including ideal gas behavior and deviations from it. 2. To clarify the importance of physical chemistry in understanding thermodynamic laws, reaction enthalpy, entropy, Gibbs free energy, and spontaneity of reactions, in addition to gas properties.	
9. Teaching and Learning Strategies	

Strategy	- Explanation and clarification - Lecture method - Discussion method				
Week	Hours	Expected Learning Outcomes	Unit or Topic Title	Learning Method	Evaluation Method
1	3 hrs	General properties of gases	Gases	Lecture	Weekly exams
2	3 hrs	Gas laws	Gases	Lecture	Weekly exams
3	3 hrs	Kinetic theory of gases	Gases	Lecture	Weekly exams
4	3 hrs	Real gases and deviations	Gases	Lecture	Weekly exams
5	3 hrs	Types of equilibrium	Chemical Equilibrium	Lecture	Weekly exams
6	3 hrs	Law of mass action	Chemical Equilibrium	Lecture	Weekly exams
7	3 hrs	Relationship of equilibrium constants	Chemical Equilibrium	Lecture	Weekly exams
8	3 hrs	Le Chatelier's Principle	Chemical Equilibrium	Lecture	Weekly exams
9	3 hrs	Effect of temperature, pressure, and concentration on equilibrium	Chemical Equilibrium	Lecture	Weekly exams
10	3 hrs	First Law of Thermodynamics	Thermodynamics	Lecture	Weekly exams
11	3 hrs	Work	Thermodynamics	Lecture	Weekly exams
12	3 hrs	Thermodynamic processes	Thermodynamics	Lecture	Weekly exams
13	3 hrs	Energy and enthalpy	Thermodynamics	Lecture	Weekly exams
14	3 hrs	Heat capacity at constant pressure and volume	Thermodynamics	Lecture	Weekly exams
15	3 hrs	Exam	First Term Exam	—	—
16	3 hrs	Thermochemistry: Enthalpy at constant pressure and volume	Thermochemistry	Lecture	Weekly exams
17	3 hrs	Heat of formation	Thermochemistry	Lecture	Weekly exams
18	3 hrs	Heat of combustion	Thermochemistry	Lecture	Weekly exams
19	3 hrs	Heat of neutralization and bond energies	Thermochemistry	Lecture	Weekly exams
20	3 hrs	Second Law of Thermodynamics	Thermodynamics	Lecture	Weekly exams
21	3 hrs	Spontaneous vs. non-spontaneous processes	Thermodynamics	Lecture	—
22	3 hrs	Carnot Cycle and entropy changes	Thermodynamics	Lecture	Weekly exams
23	3 hrs	Third Law of	Thermodynamics	Lecture	Weekly exams

		Thermodynamics and general formula			
24	3 hrs	Standard Free Energy	Thermodynamics	Lecture	Weekly exams
25	3 hrs	Relationship between Free Energy and Chemical Equilibrium	Thermodynamics	Lecture	Weekly exams
26	3 hrs	Effect of temperature and pressure on Gibbs Free Energy	Thermodynamics	Lecture	Weekly exams
27	3 hrs	Properties of liquids	Liquid Properties	Lecture	Weekly exams
28	3 hrs	Viscosity	Liquid Properties	Lecture	Weekly exams
29	3 hrs	Surface tension	Liquid Properties	Lecture	Weekly exams
30	3 hrs	Exam	Second Term Exam	—	—

10. Course Evaluation

- **Daily tests + First monthly exam: 25 marks**
- **Daily tests + Second monthly exam: 25 marks**
- **Final exam: 50 marks**

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Physical Chemistry by Dr. Layla Mohammed Najib 2. Physical Chemistry by K.K. Sharma
Main references (sources)	Chemical Thermodynamics by Dr. Omar Abdullah Al-Hazzazi
Recommended books and references (scientific journals, reports...)	Electronic References / Websites
Electronic References, Websites	

Course Description Form

1. Course Name:	Practical physical chemistry laboratory / second stage
2. Course Code:	Chem.2.4.
3. Semester / Year:	Year
4. Description Preparation Date:	11-12-2025
5. Available Attendance Forms:	

Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Mohammed mahmood masood Email: mohammed.m@uosamarra.edu	
Name : reem Ibrahim Email: reem.ibrahim@uosamarra.edu.iq	
8. Course Objectives	
1. The student learned how to calibrate laboratory equipment. 2. The student learned how to make a connection between the theoretical formula of thermodynamics and its practical application. I for the material 3. Learn mathematical and computational techniques in processing practical results.....	
9. Teaching and Learning Strategies	
Strategy	A- Cognitive objectives A- 1- The student's knowledge of obtaining a detailed idea of dangerous materials in the laboratory, such as insects. And the rules, mentioning methods of safety from these materials. A-2- Giving students a detailed idea by learning about the experiments that will be conducted in the brain. Disposal of chemicals, glass devices and tools. A-3- Students will conduct a number of experiments through which the weight of the part is extracted Comes with some vehicles. B - The skill objectives of the course B-1 The student must master graphs B-2 The student is distinguished by his learning to use each device in the laboratory B-3 The student is proficient in conducting many diverse and useful experiments with gases and chemistry. E. Thermal, solutions, phase base, surface chemistry, liquids, chemical equilibrium B-4 The student is proficient in researching external sources such as the library and the Internet through: Bidding for external activities in each of the laboratory experiments. Teaching and learning methods 1-Lectures 2-Illustration means such as: smart board Evaluation methods 1-For oral exams

	2-Monthly exams 3-Annual exams C- Emotional goals C-1 Adopting the method of dialogue between the student and the professor C-2 Preparing organized reports C-3 Adopting the discussion method D - Transferable general and qualification skills (other skills related to employability and personal development). D-1 The student's ability to work within the educational and professional work team D-2 Positive thinking and utilizing the knowledge he has received D-3 The ability to deal with parties outside the university and train with them D-4 The student should be able to learn and master the teaching profession.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2Practical	Experiment report	An introduction to the laboratory, its experiences, and the required supplies	practical	Weekly and monthly exams
Second	2Practical	Learn the graph	Mathematical treatment of practical data and the straight line equation	practical	Weekly and monthly exams
Third	2Practical	Measuring the absolute and relative viscosity of liquids	Measuring the absolute and relative viscosity of liquids	practical	Weekly and monthly exams
Fourth	2Practical	Determining the relative and absolute density of liquids using a density bottle	Determining the relative and absolute density of liquids using a density bottle	practical	Weekly and monthly exams
Fifth	2Practical	Determining the relative and absolute density of liquids using a density bottle	Determining the relative and absolute density of liquids using a density bottle	practical	Weekly and monthly exams
Sixth	2Practical	Determining the density of a solid	Determining the density of a solid	practical	Weekly and monthly exams

Seventh	2Practical	Determining the surface tension of liquids	Determining the surface tension of liquids	practical	Weekly and monthly exams
Eighth	2Practical	Determining the surface tension of liquids	Determining the surface tension of liquids	practical	Weekly and monthly exams
Ninth	2Practical	Phase equilibrium	Phase equilibrium	practical	Weekly and monthly exams
tenth	2Practical	Determining molecular weight using the Victor-Meyer method	Determining molecular weight using the Victor-Meyer method	Exam	Exam
Eleventh	2Practical	Determining molecular weight using the freezing point decrease method (Veroscopy method)	Determining molecular weight using the freezing point decrease method (Veroscopy method)	practical	Weekly and monthly exams
Twelfth	2Practical	Determining the neutralization heat of an acid and a base using a calorimeter	Determining the neutralization heat of an acid and a base using a calorimeter	practical	Weekly and monthly exams
Thirteenth	2Practical	Determining the equilibrium constant using the distribution method	Determining the equilibrium constant using the distribution method	practical	Weekly and monthly exams
fourteenth	2Practical	exam	exam	practical	Weekly and monthly exams
Fifteenth	2Practical	Determining the solubility of benzoic acid	Determining the solubility of benzoic acid	practical	Weekly and monthly exams
Sixteenth	2Practical	Determining the molar heat of vaporization using a calorimeter	Determining the molar heat of vaporization using a calorimeter	practical	Weekly and monthly exams
seventeenth	2Practical	Determining the heat of solution by measuring solubility	Determining the heat of solution by measuring solubility	practical	Weekly and monthly exams
eighteenth	2Practical	Determining the adsorption of acetic acid from an aqueous solution using animal or vegetable charcoal at	Determining the adsorption of acetic acid from an aqueous solution using animal or vegetable charcoal	practical	Weekly and monthly exams

		a constant temperature	at a constant temperature		
nineteenth	2Practical	Exam	Exam	Exam	Exam
11. Course Evaluation					
50% exam in a monthly					
25% experience report					
25% daily exams					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)		Practical physical chemistry, written by Dr. Nouri. Khalifa Fayyad and Dr. Ammar Hani Al-Dujaili			
Main references (sources)		Practical physical chemistry. Written by: A.M. James and F.E. Brigard			
Recommended books and references (scientific journals, reports...)		Practical physical chemistry, Mohamed Magdy Wasel · 2008. Practical physical chemistry, Alexander Findlay · London ; New York : Longmans, Green · 1920.			
Electronic References, Websites		Laboratory physical chemistry. by W. C. Oelke. Experimental Physical Chemistry. By W. G. Palmer https://uomustansiriyah.edu.iq/media/lectures/6/6_2021_04_10!01_01_38_PM.pdf			

Course Description Form

1. Course Name :	Second class /Teaching Thinking
2. Course Code :	chem.1.8.
3. Semester / Year :	2025/2026 year
4. Description Preparation Date :	11/1/2026

5. Available Attendance Forms :	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
1 hours / 0 units	
7. Course administrator's name (mention all, if more than one name)	
Name : Jasim Ahmed Hassan Email: jasim.ahmed@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	1. Cognitive and Theoretical Mastery: Understanding historical development of the concept of thinking, and the theoretical foundations of psychological schools to explain mental processes. 2. Development of Complex Mental Skills: The ability practice and apply critical and creative thinking strategies, as well as problem-solving, in scientific and practical situations. 3. Development of Metacognitive Thinking: Acquiring self-regulation skills and awareness of mental processes to enhance the efficiency of cognitive performance and habits of mind. 4. Educational and Methodological Application Acquiring the necessary competencies to integrate thinking skills into educational curricula, design programs for their development, and overcome obstacles.
9. Teaching and Learning Strategies	
Strategy	Instructional strategies include relying on interactive lectures designed to present the cognitive foundations and theories explaining thinking processes while encouraging students to analyze and critique them. Guided discussions are also employed to enrich classroom interaction and exchange views on complex issues in the field of thinking. To ensure the transfer of expertise into practical activities and simulations of educational situations—requiring problem-solving and decision-making skills—are integrated. Additionally, students are tasked with conducting research studies focused on integrating thinking skills into curricula, with an emphasis on self-directed learning and reflective thinking through writing periodic reports that measure development of their performance in metacognitive skills throughout the course.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theoretical lecture	Historical Roots of Teaching Thinking and Their Evolution		Lecture and discussion	Examinations
2	1 Theoretical lecture	Associationism and the Beginning of Experimental Psychology		Lecture and discussion	Examinations
3	1 Theoretical Lecture	Thinking Studies: The Würzburg Group and Otto Selz's Theory		Lecture and discussion	Examinations
4	1 Theoretical Lecture	Behavioral Theory and Its Applications in Thinking Processes		Lecture and discussion	Examinations
5	1 Theoretical Lecture	Gestalt Theory: Insight and Mental Organization		Lecture and discussion	Examinations
6	1 Practical exercise	Definitions of Thinking: Perspectives of Scientists and Researchers		Lecture and discussion	Examinations
7	1 Theoretical Lecture	Basic Mental Functions: Meaning-Making		Lecture and discussion	Examinations
8	1 Theoretical Lecture	Reasoning Processes: Immediate and Mediate		Lecture and discussion	Examinations
9	1 Theoretical Lecture	General Characteristics of Human Thinking Processes		Lecture and discussion	Examinations
10	1 Laboratory	The Relationship Between Thinking, Language, and Neural Activity		Lecture and discussion	Examinations
11	1 Practical exercise	The Role of Personal Experience in Shaping Thinking Patterns		Lecture and discussion	Examinations
12	1 Theoretical Lecture	Justifications for Teaching Thinking: Preparation for Life and Work		Lecture and discussion	Examinations
13	1 Theoretical Lecture	Dimensions of Teaching Thinking: The Faith Dimension and Academic Success		Lecture and discussion	Examinations
14	1 Theoretical Lecture	Obstacles to Teaching Thinking: Information		Lecture and	Examinations

		Overload		discussion	
15	Examinations	Examinations	Examinations	Examination	Examinations
16	1 Theoretical Lecture	Strategies for Overcoming Obstacles to Teaching Thinking		Lecture and discussion	Examinations
17	1 Theoretical Lecture	Classifications of Thinking Levels Between Simple and Complex		Lecture and discussion	Examinations
18	1 Theoretical Lecture	Basic Thinking Skills: Observation and Comparison		Lecture and discussion	Examinations
19	1 Theoretical Lecture	Classification and Information Organization Skills		Lecture and discussion	Examinations
20	1 Theoretical Lecture	Analytical Skills: Analogy, Logic and Relationships		Lecture and discussion	Examinations
21	1 Laboratory visit	Synthesis Skills: Abstraction and Attribute Analysis		Lecture and discussion	Examinations
22	1 Theoretical Lecture	Evaluation Skills: Inference and Prediction		Lecture and discussion	Examinations
23	1 Theoretical Lecture	Evaluating Criteria in Critical Thinking		Lecture and discussion	Examinations
24	1 Practical exercise	Procedural Problem-Solving Strategies		Lecture and discussion	Examinations
25	1 Theoretical Lecture	Metacognitive Thinking Skills		Lecture and discussion	Examinations
26	1 Theoretical Lecture	Approaches to Teaching Thinking: Direct Instruction vs. Infusion		Lecture and discussion	Examinations
27	1 Laboratory visit	Curriculum Design Methods for Teaching Thinking		Lecture and discussion	Examinations
28	1 Theoretical Lecture	Developing Intelligent Behavior and Evaluation Criteria for Thinking Programs		Lecture and discussion	Examinations
29	1 Theoretical Lecture	Practical Challenges: Divergent Thinking Definitions and Evaluation Methods		Lecture and discussion	Examinations

30	Examinations	Examinations	Examinations	Examination	Examinations
11. Course Evaluation					
- Daily exam + first semester exam (25 degree) - Daily exam + second semester exam (25 degree) - final exam (50 degree)					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			"Teaching Thinking: Concepts, Applications, and Strategies" by Dr. Fathi Abdel Rahman Jarwan		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			The Edward de Bono Group and The Foundation for Critical Thinking		
Electronic References, Websites					

Course Description Form

1. Course Name:	
Educational leadership and management	
2. Course Code:	
Chem 2.6.	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
14/1/2026	
5. Available Attendance Forms:	
Attendance in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 / 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Noor Abdul Kareem Majeed: Email: noor.ab.ma@uosamarra.edu.iq	
8. Course Objectives	
Course Objective	1- Defining some basic concepts of communication and communication

	processes. 2- Identify the most important conditions for effective communication and its basic skills. 3- Identify the most prominent obstacles to communication in different educational styles. 4- Identify the most important skills targeted behind the communication process in various educational institutions. 5- Identify the most prominent features of the secondary education system in Iraq. 6- Identify the most distinguished models of secondary education in the world. 7- Identify the concept of public administration and its historical development. 8- Identifying the most prominent schools of management and their intellectual trends. 9- Learn about educational administration and its philosophy. 10- Identify educational administration and its characteristics. 11- Getting to know school administration, the nature of its work and its importance. 12- Comparing the different styles used in management. 13- Learn about classroom management. Identify the most common problems in the classroom and how to deal with them.
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9. Teaching and Learning Strategies

Strategy	1- Theoretical lectures. 2- Open discussion. 3- Cooperative learning. 4-Brainstorming. 5- Presentations.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1+2	4	communication and communication	communication and communication	1- Theoretical lectures	Oral test
3+4	=	Conditions and skills for effective communication	Conditions and skills for effective communication	2- Open discussion.	=

5+6	=	Some knowledge related to effective	Some knowledge related to effective	3- Cooperative learning.	Interrogation Interrogation Written evaluative test
7+8	=	communication	communication	Brainstorming.	Oral test
9+10	=	types of communication and its obstacles	types of communication and its obstacles	5- Presentations.	Written evaluative test
11+12	=	The secondary education system in the United States of America	the secondary education system in the United States of America	=	Oral test
13+14	=	secondary education system in Japan	Secondary education system in Japan	=	=
15	2	Evaluative test	Evaluative test	=	=
16+17	4	The secondary education system in Sweden	the secondary education system in Sweden	=	=
18+19	=	educational administration and the factors affecting it	educational administration and the factors affecting it	=	=
20+21	=	Management styles and their impact on educational administration	Management styles and their impact on educational administration	=	=
22+23	=	Some students' problems inside the classroom	Some students' problems inside the classroom	=	=
24+25	=	Some students' problems inside the classroom Evaluative test	Some students' problems inside the classroom Evaluative test	=	=

11. Course Evaluation

- Daily quiz + 1st monthly quiz 25 marks
- Daily quiz + 2nd monthly quiz 25 marks
- Final exam 50 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

	Education: Youssef Yacoub Shehadeh and Ali Katab Kazem
Main references (sources)	Secondary education - Youssef Qahtan // Class management and organization - Muhammad Khamis
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	www.edutrapef.net / www.edutrapia.illaf.net / www.Mohammediapesse.com / www.feedo.net www.aricles.Islam / www.happy-family.com / www.acofps.com / www.mesoport.com / www.uobabylon.edu.iq

Course Description Form

1. Course Name :	
Curriculum and Textbook	
2. Course Code :	
Chem.2.7.	
3. Semester / Year :	
2025-2026 year	
4. Description Preparation Date :	
23/12/2025	
5. Available Attendance Forms :	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
1 hours / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name Dr. Mohammed Madloul Mohammed Email : Mohamed.madlol@uosamara.edu.iq	
8. Course Objectives	
Course Objectives	Understand curriculum foundations, elements and theories. • Recognize different curriculum perspectives. • Apply curriculum development concepts. • Analyze contemporary curriculum issues. • Appreciate the value of curriculum and school

			textbooks.		
9. Teaching and Learning Strategies					
Strategy		Active Learning, Cooperative Learning, Brainstorming, Guided Discussion, Task Analysis, Problem Solving.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theoretical lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum foundations and elements	Lecture and discussion	Quiz & Exams
2	1 Theoretical lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum foundations and elements	Lecture and discussion	Quiz & Exams
3	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum foundations and elements	Lecture and discussion	Quiz & Exams
4	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum theories	Lecture and discussion	Quiz & Exams
5	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum theories	Lecture and discussion	Quiz & Exams
6	1 Practical exercise	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum theories	Lecture and discussion + Laboratory	Quiz & Exams
7	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams

8	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams
9	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams
10	1 Laboratory visit	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion + Laboratory	Quiz & Exams
11	1 Practical exercise	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion + Laboratory	Quiz & Exams
12	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams
13	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams
14	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion	Quiz & Exams
15	1 Laboratory visit	Remembering understanding Applying analyzing synthesizing and evaluating	Types and organizations of curricula	Lecture and discussion + Laboratory	Quiz & Exams
16	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum and contemporary issues	Lecture and discussion	Quiz & Exams
17	1 Theoretical Lecture	Remembering understanding Applying	Curriculum and contemporary	Lecture and	Quiz & Exams

		analyzing synthesizing and evaluating	issues	discussion	
18	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum and contemporary issues	Lecture and discussion	Quiz & Exams
19	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum and contemporary issues	Lecture and discussion	Quiz & Exams
20	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum and contemporary issues	Lecture and discussion	Quiz & Exams
21	1 Laboratory visit	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion + Laboratory	Quiz & Exams
22	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion	Quiz & Exams
23	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion	Quiz & Exams
24	1 Practical exercise	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion + Laboratory	Quiz & Exams
25	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion	Quiz & Exams
26	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing	Curriculum evaluation and development	Lecture and discussion	Quiz & Exams

		and evaluating			
27	1 Laboratory visit	Remembering understanding Applying analyzing synthesizing and evaluating	Curriculum evaluation and development	Lecture and discussion + Laboratory	Quiz & Exams
28	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	School textbook	Lecture and discussion	Quiz & Exams
29	1 Theoretical Lecture	Remembering understanding Applying analyzing synthesizing and evaluating	School textbook	Lecture and discussion	Quiz & Exams
30	1 Practical exercise	Remembering understanding Applying analyzing synthesizing and evaluating	School textbook	Lecture and discussion + Laboratory	Quiz & Exams

11. Course Evaluation

- Quizzes
- Written Objective and Essay Tests
- Writing Short Reports
- Portfolios
-

12. Learning and Teaching Resources

Required Textbook:

Main References:

Electronic Resources:

College of Education website and Ministry of Education curriculum resources.

Course Description Form

1. Course Name:	
English Language/second stage	
2. Course Code:	
Chem.2.9.	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
24/12/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours/2 Number of Units	
7. Course administrator's name (mention all, if more than one name)	
Name: dr. mohammed mahmood masood Email: mohammed.m@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	The aim of this course is to help students to achieve English language through: - Enable students to define & use target vocabulary and grammar forms in meaningful writing and speaking contexts. - Enable students to identify and analyze information related to a reading or listening topic.
9. Teaching and Learning Strategies	
Strategy	Communicative language teaching (CLT) This approach is probably now the most popular teaching model for English language teaching globally through focus on fluency of communication rather than accuracy. Lessons are more hands-on than theoretical. Interactive and relevant classroom activities characterise this approach along with the use of authentic source materials. The use of personal experience is also common in CLT classrooms.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	One hour	Unit 1 Getting to know you I	Tenses and questions Tenses Questions Using a bilingual dictionary Social expressions	dialogic teaching: involves ongoing talk between teacher and students	daily exam
2	One hour	Unit 1 Getting to know you I	Solve unit 1 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
3	One hour	Unit 2 <i>The way we live</i>	Present tenses • <i>have/have got</i> • Collocation - daily life • Making conversation	dialogic teaching: involves ongoing talk between teacher and students	daily exam
4	One hour	Unit 2 <i>The way we live</i>	Solve unit 2 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
5	One hour	Unit 3 It all went wrong	Past tenses • Word formation • Time expressions	dialogic teaching: involves ongoing talk between teacher and students	daily exam
6	One hour	Unit 3 It all went wrong	Solve unit 3 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
7	One hour	Unit 4 Let's go shopping !	<i>much/many</i> • <i>some/any</i> • <i>a few, a little, a tot of</i>	dialogic teaching: involves ongoing talk between teacher and students	daily exam

			• Articles • Shopping • Prices		
8	One hour	Unit 4 Let's go shopping!	Solve unit 4 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
9	One hour		Semester one examination		semester exam
10	One hour	Unit 5 What do you want to do?	Verb patterns 1 • Future forms • Hot verbs • How do you feel?	dialogic teaching: involves ongoing talk between teacher and students	daily exam
11	One hour	Unit 5 What do you want to do?	Solve unit 5 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
12	One hour	Unit 6 Tell me! What's it like?	<i>What... like?</i> • Comparatives and superlatives • Synonyms and antonyms • Directions	dialogic teaching: involves ongoing talk between teacher and students	daily exam
13	One hour	Unit 6 Tell me! What's it like?	Solve unit 6 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
14	One hour	Unit 7 Fame	Present Perfect • <i>for, since</i> • Adverbs, word pairs • Short answers	dialogic teaching: involves ongoing talk between teacher and students	daily exam
15	One hour	Unit 7 Fame	Solve unit 7 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
16	One hour	Unit 8 Do's and	Have(got)to Should/must	dialogic teaching: involves ongoing talk between teacher	daily exam

		don'ts	Words that got together	and students	
17	One hour	Unit 8 Do's and don'ts	Solve unit 8 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
18	One hour		Semester two examination	dialogic teaching: involves ongoing talk between teacher and students	Semester exam
19	One hour	Unit 9 At the doctors	Going places Time clauses Hot verbs In hotel	dialogic teaching: involves ongoing talk between teacher and students	daily exam
20	One hour	Unit 9 At the doctors	Solve unit 9 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
21	One hour	Unit 10 Scared to death	Verb patterns Mange to Used to ed/ing adjective Exclamations	dialogic teaching: involves ongoing talk between teacher and students	daily exam
22	One hour	Unit 10 Scared to death	Solve unit 10 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
23	One hour	Unit 11 Things that charged	The world Passives Verb's and named that go together	dialogic teaching: involves ongoing talk between teacher and students	daily exam
24	One hour	Unit 11 Things that charged	Solve unit 11 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
25	One hour	exam	Semester two examination Trial two	dialogic teaching: involves ongoing talk between teacher and students	Semester exam
26	One hour	Unit 12 Dreams	Second conditional Might	dialogic teaching: involves ongoing talk between teacher	daily exam

		and reality	Phrasal verbs	and students	
27	One hour	Unit 12 Dreams and reality	Solve unit 12 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam

11. Course Evaluation

Monthly exams	30%
Daily exams	10%
Reports and homework	10%
Final exam	50%
Total	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-New Headway Pre-Intermediate: Student's Book . Liz and John Soars -New Headway Pre-Intermediate: workbook . Liz and John Soars
Main references (sources)	-New Headway Pre-Intermediate: test Book . Liz and John Soars
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://elt.oup.com/student/headway/preint4/download?cc=global&selLanguage=en

Third stage

Course Description Form

1. Course Name:					
Organic Chemistry					
2. Course Code:					
Chem.3.1.					
3. Semester / Year:					
Annual					
4. Description Preparation Date:					
2025/12/11					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
7/60					
7. Course administrator's name (mention all, if more than one name)					
Name: Sajid Khalil Mahmmoud Email: sajed.k.m@ousamarra.edu.iq					
8. Course Objectives					
Course Objectives		- Introducing students to: - Factors affecting the abundance of electrons in bonds and atoms - Everything related to acids and bases, their increase and decrease - Methods of preparing intermediate compounds, their stability and interactions - Nucleophilic substitution reactions - Elimination reactions - Multicyclic Aromatic compounds (duality and trilogy)			
9. Teaching and Learning Strategies					
Strategy		1- Read chapters carefully: Read chapters carefully and attentively, trying to understand the key concepts. 2- Solve problems and exercises: Solve the problems and exercises at the end of each chapter to improve your understanding of the concepts. 3- Use presentation tools: Use data shows to understand molecular structures and chemical reactions. 4- Continuous review: Regularly review material to improve understanding and consolidate information. 5- Discuss with students: Discuss difficult topics with students to improve understanding. 6- Use other techniques: Such as books and educational websites to improve understanding. By using these strategies, you can improve your understanding of "Introduction to Organic Chemistry" and achieve academic success			
10. Course Structure					
Week	Hours	Required Learning	Unit or subject name	Learning method	Evaluation

		Outcomes			method
1	2 Theoretical	Acids	Acids: their definition, origin, aliphatic acids	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
2	2 Theoretical	Acids	Phenols, aromatic carboxylic acids	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
3	2 Theoretical	Bases	Bases: definition, aliphatic bases	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
4	2 Theoretical	Bases	Aromatic bases, heterocyclic bases	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
5			Exam		Monthly exam
6	2 Theoretical	Carbonium	Carbonium ion: methods of its formation, structure, Its stability	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
7	2 Theoretical	Carbonium	Carbonium ion reactions with examples	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
8	2 Theoretical	Carbonium	Types of carbonium ion rearrangements	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
9	2 Theoretical	Carbanion	Rearrangement into O and N atoms lacking electrons	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
10			Exam		Monthly exam
11	2 Theoretical	Carbanion	Carbanion ion: methods of its formation, structure, Its stability	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
12	2 Theoretical	Carbanion	Carbanion reactions: interactions addition and its mechanics	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
13	2 Theoretical	Carbanion	Complement addition reactions and its mechanics	Lecture with procedure Dialogue and discussion	Quarterly and daily tests

14	2 Theoretical	Carbanion	Displacement reactions and their mechanics	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
15	2 Theoretical	Carbanion	Rearrangement reactions and their mechanisms	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
16			Mid-year exams		
			Half year holiday		
17	2 Theoretical	Nucleophilic substitution on a saturated carbon atom	Nucleophilic substitution on a saturated carbon atom: Compensation mechanics SN1 and SN2	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
18	2 Theoretical	Nucleophilic substitution on a saturated carbon atom	Applications and examples of compensation mechanics: SN1 And SN2 and SNi	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
19	2 Theoretical	Nucleophilic substitution on a saturated carbon atom	The effect of neighboring groups on compensation interactions with examples and its mechanics	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
20	2 Theoretical	Elimination reactions	Elimination reactions: their definition and types	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
21	2 Theoretical	Elimination reactions	Direction in elimination reactions and the effect of active groups on elimination	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
22			Exam		Monthly exam
23	2 Theoretical	Free radicals	Free radicals: their definition, structure, stability, and methods of formation	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
24	2 Theoretical	Free radicals	Free radicals Reaction	Lecture with procedure Dialogue and discussion	Quarterly and daily tests

25	2 Theoretical	Pentacyclic heterocyclic compounds	Pentacyclic heterocyclic compounds: types, naming it, methods of preparing it	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
26	2 Theoretical	Pentacyclic heterocyclic compounds	Reactions of pentacyclic heterocyclic compounds	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
27	2 Theoretical	Hexagram heterocyclic compounds	Hexagram heterocyclic compounds: types, naming it, methods of preparing it	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
28	2 Theoretical	Hexagram heterocyclic compounds	Reactions of Hexagram heterocyclic compounds	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
29	2 Theoretical	Multicyclic aromatic compounds	Multicyclic aromatic compounds: naphthalene and its derivatives, their preparation and reactions	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
30	2 Theoretical	Multicyclic aromatic compounds	Anthracene, phenanthrene and their derivatives, preparation and their interactions	Lecture with procedure Dialogue and discussion	Quarterly and daily tests

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)	A guidebook to mechanism in organic chemistry by Peter Sykes, 6th ed., John Wiley and Sons, Inc., New York, 1985
Main references (sources)	Organic Chemistry by Francis A. Carey, 10th ed., Published 2016
Recommended books and references (scientific journals, reports...)	Organic chemistry by Morrison and Boyd, 6th ed., Prentice-Hall of India Private Limited, New Delhi, 2002 MARCH'S advanced organic chemistry by Michael B. Smith and Jerry March, 6th ed., John Wiley and Sons, Inc., New Jersey, 2007

Electronic References, Websites	https://www.masterorganicchemistry.com/reaction-guide/
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Course Description Form

1. Course Name:	
Practical organic chemistry/third stage	
2. Course Code:	
Chem. 3.1.P.	
3. Semester / Year:	
year	
4. Description Preparation Date:	
24/12/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 hours/7units	
7. Course administrator's name (mention all, if more than one name)	
Name: Mustafa Abdel Qader Fadel Email: mostafa.abd@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	Preparing organic compounds practically according to each experiment and its special conditions. Rates, amides and ketones ,Aldehydes, chaff bases, and carboxylic acids..
9. Teaching and Learning Strategies	
Strategy	A- Cognitive objectives 1- Enable the student to obtain theoretical knowledge of organic chemistry 2- The student's knowledge of the structures of esters, amides, ketones, aldehydes, and liposome bases. carboxylic acids 3- Introducing the student to the mechanics of reactions prepared from esters, imides and keto Nats, aldehydes, chaff bases, and carboxylic acids B - The skill objectives of the course 1 - The student is proficient in preparing each of the esters, amides, ketones, aldehydes, and bases. Smells and acids Carboxylic. 2-Distinguish between some compounds such as esters, carboxylic acids, and ketones. Ions and aldehydes. 3-Distinguishing between intermediates of reactions and methods of preparing them. 4-The student is proficient in writing the special structures of some organic compounds.

1 Lectures 2- Demonstration means such as: the smart board 3- Use of the projector Use of laboratory materials And measuring devices 1- Oral exams 2- Monthly exams 3- Annual exams					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2practica	Synthesis of Schiff Bases1	Synthesis of one of the imine compounds	Laboratory	Weekly exams and laboratory reports
2	2practica	Estarat	P- hydroxy ethyl benzoate	Laboratory	Weekly exams and laboratory reports
3	2practica	Cannizzaro Reaction	Benzyl alcohol and sodium Benzoate	Laboratory	Weekly exams and laboratory reports
4	2practica	Synthesis of Azo dyes	)phenyldiazoyl3-2-Naphthol	Laboratory	Weekly exams and laboratory reports
5	2practica	Synthesis of diazonium salt	Synthesis of diazonium	Laboratory	Weekly exams and laboratory reports
6	2practica		Monthly test		Weekly exams and laboratory reports
7	2practica	Preparation of heterocyclic compounds	Preparation of 3,5-dimethyl pyrazol	Laboratory	Weekly exams and laboratory reports
8	2practica	condensation Reaction	Preparation of Chalcones	Laboratory	Weekly exams and laboratory reports
9	2practica	Rearrangem ent dilate	Pinacol to Pinacolone Rearrangement	Laboratory	
10	2practica	Isolation of natural products	Isolation of caffeine from tea	Laboratory	Weekly exams and laboratory reports
11	2practica	Beckmann Rearrangement	N-Phenylbenzamide (Caprolactam)	Laboratory	Weekly exams and laboratory reports
12	2practica		Monthly test		
13	2practica	Aldol condensation	Preparation of dibenzalacetone	Laboratory	Weekly exams and laboratory reports
14	2practica	diketones	Oxidation of Benzoin to benzil	Laboratory	Weekly exams and laboratory reports
15	2practica	Perkin condensation	Preparation of Cinnamic acid	Laboratory	Weekly exams and laboratory reports
16	2practica	Synthesis of carboxylic acid	Benzilic acid Rearrangement	Laboratory	Weekly exams and laboratory reports
17	2practica	Aldehyde	β -Hydroxy- α -naphthaldehyde	Laboratory	Weekly exams and laboratory reports
18	2practica		Monthly test		Weekly exams and laboratory reports
11. Course Evaluation					
- Course exams 15					

- Weak exams 7.5 - Reports 3.5 - Remarkable participations 3.5	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Binding practical organic chemistry / for the third stage
Main references (sources)	Comprehensive practical organic chemistry Practical organic chemistry
Recommended books and references (scientific journals, reports...)	(Vogel's Textbook of Practical Organic Chemistry), 5th Ed., by A.I. Vogel, B.S. Furnis, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, 1989.
Electronic References, Websites	(Experimental Organic Chemistry), 3rd Ed. By Philippa B. Cranwell, Laurence M. Harwood, Christopher J. Moody, 2017.

Course Description Form

1. Course Name:	
Inorganic Chemistry – Coordination Chemistry / Third Year	
2. Course Code:	
CHEM3.2.P	
3. Semester / Year:	
YEAR	
4. Description Preparation Date:	
10-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60hours (theory) /5 units	
7. Course administrator's name (mention all, if more than one name)	
Dr. Osama Ahmed Yaseen	
8. Course Objectives	
1. Course Objective Identify transition elements and their chemical and physical properties. 2. Understand the structure of coordination complexes and the types and applications of ligands. 3. Become familiar with different bonding theories in coordination compounds. 4. Learn the various methods of synthesizing coordination complexes and their reaction mechanisms. 5. Analyze the spectroscopic and magnetic properties of metal complexes.	

6. Comprehend the concepts of stability and kinetics in coordination chemistry.

9. Teaching and Learning Strategies

Strategy

- 1. Interactive theoretical lectures**
- 2. Practical applications in the laboratory**
- 3. Group discussions and analytical problem-solving**
- 4. Visual presentations of modern complex models using educational aid**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Identify transition elements and their characteristics	Introduction to Transition Elements	Interactive lecture + class discussion	Daily question
Second	2	Distinguish transition series and analyze their general properties	d, 4d, 5d Transition 3 Series	Lecture with applied examples	Daily test
Third	2	Classify ligands and understand coordination numbers and complex geometries	Types of Ligands	Lecture + Diagrams	In-class exercise
Fourth	2	Analyze the structure and charge of complexes and calculate oxidation states	Types of Complexes + Oxidation States	Theoretical explanation + problem-solving	Analytical question
Fifth	2	Apply IUPAC rules for naming coordination complexes	IUPAC Nomenclature Rules	Lecture + Practice	Short quiz
Sixth	2	Understand structural isomers and analyze examples	Structural Isomerism	Lecture + Model Presentation	Daily quiz
Seventh	2	Distinguish geometric and optical isomers	Stereoisomerism (Coordination number 4 and 6)	Interactive lecture	Practical exercise
Eighth	2	Understand classical bonding theories and evaluate their strengths and limitations	Chain Theory, Werner's Theory, Valence Bond Theory	Lecture + Comparative analysis	Analytical question
Ninth	2	Interpret crystal field effects and stabilization energy	Crystal Field Theory – CFSE	Illustrated explanation	Short quiz
tenth	2	Compare crystal field and valence bond theories and their applications	Comparative Theory + Applications	Presentation + Solved Problems	Written evaluation
Eleventh	2	Explain Molecular Orbital Theory (MOT) and bonding in complexes	MOT in Coordination Complexes	Interactive explanation + Diagrams	Daily question

Twelfth	2	Learn different synthetic routes for coordination compounds	Synthesis of Coordination Compounds	Applied lecture	Monthly quiz
Thirteenth	2	Analyze thermal and thermodynamic stability and calculate formation constants	Stability of Complexes	Solved problems + Theoretical review	Test
Fourteenth	2	Determine structural formulas using molar ratios and continuous variation methods	Structural Determination of Complexes	Practical application	In-class exercise
Fifteenth	2	Analyze substitution and redox reaction mechanisms	Kinetics and Mechanisms of Reactions	Theoretical presentation + Diagrams	Short exam
Sixteenth	2	Explain trans effect and study kinetics in octahedral complexes	Trans Effect + Octahedral Complexes	Discussion + Real-world examples	Group evaluation
Seventeenth	2	Understand electronic spectra and paramagnetic behavior	Electronic Spectra + Paramagnetism	Lecture with lab data	Spectral analysis
Eighteenth		Analyze ligand field transitions and spectral interactions	Ligand Field Spectra + Energy Diagrams	Diagram analysis	Spectral test
Nineteenth		Solve advanced spectral problems and interpret results	Applications of Electronic Spectroscopy	In-class exercises	Oral evaluation
Twenty		Extend understanding of organometallics and the Effective Atomic Number Rule	Organometallic Complexes + EAN Rule	Final lecture + Review	Final exam

11. Course Evaluation

Daily quizzes + First monthly exam: 17.5 marks
Daily quizzes + Second monthly exam: 17.5 marks
Final exam: 35 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Naaman Saad Eldeen. Inorganic Chemistry: Transition Elements and Coordination Principles. Baghdad: University of Baghdad; 1980. Ihsan Abdul-Ghani Mustafa. Inorganic and Coordination Chemistry. Mosul: University of Mosul; 1988.
Main references (sources)	Nakamoto. Infrared Spectra of Inorganic and Coordination Compounds. Translated by Issam Jirjees. Mosul: University of Mosul; 1982. Miessler Gary, Fischer Paul, Tarr Donald. Inorganic Chemistry. 5th Edition. New York: Pearson; 2014.

	Basolo Fred. Mechanisms of Inorganic Reactions. New York: Wiley, 1967. Huheey James E., Keiter Ellen A., Keiter Richard L. Inorganic Chemistry: Principles of Structure and Reactivity. 4th ed. San Francisco: Pearson Education; 2008.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Inorganic Chemistry Laboratory / Third Year	
2. Course Code:	
CHEM.3.2.p	
3. Semester / Year:	
year	
4. Description Preparation Date:	
10-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 Laboratory Hours / 5 Credit Units	
7. Course administrator's name (mention all, if more than one name)	
Dr. Osama Ahmed Yaseen	
8. Course Objectives	
a. Train students on the basics of safe laboratory practices. b. Synthesize various coordination complexes using different experimental methods. c. Apply theoretical principles in the preparation and characterization of inorganic compounds. d. Develop observation skills and basic spectral analysis techniques. e. Use laboratory tools and techniques to identify physical and chemical properties of complexes. f. Enhance scientific report writing and data interpretation skills.	

9. Teaching and Learning Strategies

Strategy

- i. Pre-laboratory instructional briefings.
- ii. Hands-on practical experiments performed by students.
- ii. Discussion of experimental results and comparison with theoretical values.
- iv. Weekly evaluation of student reports and observations.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	Recognize lab instructions and chemical safety procedures	General Laboratory Safety Instructions	Lecture + Practical	Preliminary Evaluation
Second	3	Identify transition metal complexes and how to synthesize them	Experiment: Synthesis of Nickel Complex with Diethylenetriamine	Hands-on Experiment	Observation + Discussion
Third	3	Learn hot filtration and prepare copper-ammonia complexes	Experiment: Synthesis of Copper-Ammonia Complex	Practical Application	Lab Report
Fourth	3	Identify multidentate ligands	Experiment: Synthesis of Nickel Complex with TETA	Laboratory Experiment	Direct Assessment
Fifth	3	Understand HSAB (Hard Soft Acid Base) concept	Theoretical discussion + acid-base classification examples	Interactive Lecture	Oral Quiz
Sixth	3	Synthesize SCN^- ligand complexes and observe color changes	Experiment: Synthesis of Fe(III)-Thiocyanate Complex	Practical Application	Practical Report
Seventh	3	Study non-transition metal complexes	Experiment: Synthesis of Potassium Trioxalatoaluminate	Hands-on + Group Discussion	Analytical Questions
Eighth	3	Analyze stability and spectroscopic properties	Experiment: Synthesis of Copper(I)-Thiourea Complex	Lab Work + Theoretical Discussion	Lab Evaluation
Ninth	3	Apply redox principles in synthesis	Experiment: Synthesis of Chromium Oxalate Complex	Thermal Reaction + Analysis	Detailed Report
tenth	3	Apply kinetic principles in ligand substitution	Experiment: Monitoring Ligand Exchange Reaction	Time-based Monitoring	Analytical Test

Eleventh	3	Understand isomerism and nomenclature in coordination compounds	Exercise: Naming Complexes and Isomer Analysis	Classroom Activity	Short Quiz
Twelfth	3	Perform UV-Vis spectral analysis for selected complexes	Experiment: Spectral Analysis Using Visual Instruments	Spectral Presentation	Graphical Analysis
Thirteenth	3	Understand coordination reaction mechanisms	Discussion: Mechanisms with Solved Examples	Group Discussion	Group Evaluation
Fourteenth	3	Comprehensive review of all prior experiments	Review + Final Report Writing Training	Problem Solving	General Test
Fifteenth	3	Final practical exam	Evaluation of Lab Performance and Reports	Practical Implementation	Final Practical Exam

11. Course Evaluation

- **Daily assessments + First monthly exam: 7.5 marks**
- **Daily assessments + Second monthly exam: 7.5 marks**
- **Final practical exam: 15 marks**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Naaman Saad Eldeen. Inorganic Chemistry: Transition Elements Coordination Principles. Baghdad: University of Baghdad; 1980. Ihsan Abdul-Ghani Mustafa. Inorganic and Coordination Chemistry. Mosul: University of Mosul; 1988.
Main references (sources)	Nakamoto. Infrared Spectra of Inorganic and Coordination Compounds. Translated by Issam Jirjees. Mosul: University of Mosul; 1982. Miessler Gary, Fischer Paul, Tarr Donald. Inorganic Chemistry. 5th ed. New York: Pearson; 2014. Basolo Fred. Mechanisms of Inorganic Reactions. New York: Wiley; 1967. Huheey James E., Keiter Ellen A., Keiter Richard L. Inorganic Chemistry: Principles of Structure and Reactivity. 4th ed. San Francisco: Pearson Education; 2008.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:					
Physical Chemistry					
2. Course Code:					
Chem.3.4					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
10/12/2025					
5. Available Attendance Forms:					
Regularity					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hours / 7 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Hassan faisal mohammed Email: hassan.fis.mu@uosamarra.edu.iq					
8. Course Objectives					
1. Developing academic education at the university and college in accordance with quality standards in higher education, which enables universities to produce outputs that are able to be produced in the labor market. 2. Explaining the basic concepts of kinetic and electrical chemistry, clarifying the theories and their development, laws and equations, and how to derive them. 3. Developing students' skills in using the computer to process results and using it to draw graphs to obtain precise and accurate results.			4. Explaining the importance of physical chemistry in monitoring the reaction rate, calculating the reaction rate constant, calculating the activation energy, and the importance of the effect of temperature on this. Explaining the most important applications of kinetic and electrical physical chemistry and their importance in the practical field.		
9. Teaching and Learning Strategies					
Strategy	1- Explanation and clarification. 2- Lecture method. 3- Discussion method.				
10- The course structure					
Evaluation	Teaching method	outcomes Name of unit/or	Required	hours	week

method		subject	learning		
Oral and exams	Explanation and clarification	Kinetic chemistry	Introduction	2th+2p	1
Oral and exams	Explanation and clarification	Kinetic chemistry	Reaction rate	2th+2p	2
Oral and exams	Explanation and clarification	Kinetic chemistry	Zero order	2th+2p	3
Oral and exams	Explanation and clarification	Kinetic chemistry	first order	2th+2p	4
Oral and exams	Explanation and clarification	Kinetic chemistry	Examples and solutions	2th+2p	5
Oral and exams	Explanation and clarification	Kinetic chemistry	Second order	2th+2p	6
Oral and exams	Explanation and clarification	Kinetic chemistry	Third order	2th+2p	7
Oral and exams	Explanation and clarification	Kinetic chemistry	Examples and solutions	2th+2p	8
Oral and exams	Explanation and clarification	Kinetic chemistry	Half-life of reactions	2th+2p	9
Oral and exams	Explanation and clarification	Kinetic chemistry	Different methods for calculation order	2th+2p	10
Oral and exams	Explanation and clarification	Kinetic chemistry	General method	2th+2p	11
Oral and exams	Explanation and clarification	Kinetic chemistry	Insulation method	2th+2p	12
Oral and exams	Explanation and clarification	Kinetic chemistry	Effect of temperature on reaction rate	2th+2p	13
Oral and exams	Explanation and clarification	Kinetic chemistry	Calculate activation energy and frequency coefficient	2th+2p	14
Oral and exams	Explanation and clarification	Kinetic chemistry	First semester exam	2th+2p	15
Oral and exams	Explanation and clarification	Electrochemistry	introduction	2th+2p	16
Oral and exams	Explanation and clarification	Electrochemistry	Some electrochemistry terms	2th+2p	17

Oral and exams	Explanation and clarification	Electrochemistry	oxidation and reduction	2th+2p	18
Oral and exams	Explanation and clarification	Electrochemistry	Examples and solutions	2th+2p	19
Oral and exams	Explanation and clarification	Electrochemistry	Electrolytic conduction	2th+2p	20
Oral and exams	Explanation and clarification	Electrochemistry	Equivalent conductivity	2th+2p	21
Oral and exams	Explanation and clarification	Electrochemistry	Equivalent conductivity at infinity of dilution	2th+2p	22
Oral and exams	Explanation and clarification	Electrochemistry	Measurement of electrical conductivity	2th+2p	23
Oral and exams	Explanation and clarification	Electrochemistry	Factors affecting connectivity	2th+2p	24
Oral and exams	Explanation and clarification	Electrochemistry	Applications in electrical conductivity measurements	2th+2p	25
Oral and exams	Explanation and clarification	Electrochemistry	Nernst equation	2th+2p	26
Oral and exams	Explanation and clarification	Electrochemistry	Ionic medium	2th+2p	27
Oral and exams	Explanation and clarification	Electrochemistry	Transition preparation	2th+2p	28
Oral and exams	Explanation and clarification	Electrochemistry	Standard electrodes	2th+2p	29
Oral and exams	Explanation and clarification	Electrochemistry	Second semester exam	2th+2p	30

11. Course Evaluation

- Semester exam (theory 35 + practical 15) = 50%
- Final exam (theoretical 35 + practical 15) = 50%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1 - Physical Chemistry Dr. Laila Muhammad Naguib 2 - Physical Chemistry K. K. Sharman
Main references (sources)	Kinetic and electrochemistry, Dr. Abdul Majeed Al-Dabbagh and Dr. Banan Ahmed Al-Aqrawi and the book of kinetic and electrochemistry, Dr. Omar Abdullah Al-Hazzazi

Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Physical chemistry/practical	
2. Course Code:	
Chem.3.4.P.	
3. Semester / Year:	
year	
4. Description Preparation Date:	
24-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
7/90	
7. Course administrator's name (mention all, if more than one name)	
Name: Saba Thamer	Email: Saba.th.m@uosamarra.edu.iq
Name: Sama Ali	Email: Samaali919s@gmail.com
Name: Reem Ibrahim	Email: reem.ibrahim@uosamarra.edu.iq
8. Course Objectives	
Course Objectives	Includes course objectives - General objectives of the course :Developing students' scientific and cognitive skills in the following areas: 1 The student learned how to use and deal with laboratory equipment 2 Learn mathematical and computer techniques in processing practical results 3 The student learned how to link the abstract formula of kinetic chemistry with the practical application of the subject.
9. Teaching and Learning Strategies	
Strategy	The student must master the mathematical operations to extract the orders of reaction, calculate the value of the constant, and graphs. B2 - The student is distinguished by learning to use each device in the laboratory B3 - The student is proficient in researching external sources such as the

library and the Internet through: Offering external activities in each laboratory experiment.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Experiment report	Know the reaction rate and types of chemical reactions	Lecture with dialogue and discussion	Quarterly and daily tests
2	2	Finding the rate constant, velocity and half-life	For hydrolysis of methyl acetate catalyzed by hydrochloric acid	Lecture with dialogue and discussion	Quarterly and daily tests
		Finding the reaction rate constant	Decomposition of ethyl acetate by sodium hydroxide	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Finding the rate constant, velocity and half-life	Decomposition of diazanium benzene chloride	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Finding the rate constant, velocity and half-life	Reaction of acetone with iodine in the presence of acid as a catalyst	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Finding the rate constant for the ionic reaction	The effect of catalytic salt on the speed of the reaction between sodium persulfate and potassium iodide	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Finding the rate constant, velocity and half-life	Hydrolysis of ethyl acetate in the presence of sodium hydroxide base	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Finding the rate constant, velocity and half-life	Sulfite radical with iodate radical	Lecture with dialogue and discussion	Quarterly and daily tests
	2	Determine the order of the reaction and the rate of reaction rate	Study of the autocatalytic reaction between potassium permanganate and oxalic acid	Lecture with dialogue and discussion	Quarterly and daily tests
10	2	Determine the order of the reaction	Introduction to electrochemistry and the study of chemical transformations resulting from the passage of an electric current	Lecture with dialogue and discussion	Quarterly and daily tests

11	2	Electrochemistry	It is used to convert chemical energy into electrical energy and vice versa	Lecture with dialogue and discussion	Quarterly and daily tests
12	2	The purpose of studying electrochemistry	It is used in purifying minerals, preparing some elements, and in the manufacture of various batteries	Lecture with dialogue and discussion	Quarterly and daily tests
13	2	The importance of electrochemistry	Study of electrical units And the relationship between them	Lecture with dialogue and discussion	Quarterly and daily tests
14	2	Clarification of units	AC and DC current	Lecture with dialogue and discussion	Quarterly and daily tests
15	2	Electrical sections	Conductors, insulating materials, semiconductors and electrolytes	Lecture with dialogue and discussion	Quarterly and daily tests
16	2	Classification of materials according to their conductivity of electrical current	The reactions are divided into two parts: one that deals with oxidation and the other that deals with reduction	Lecture with dialogue and discussion	Quarterly and daily tests
17	2	oxidation and reduction	Galvanic cells that produce electric current, such as the Daniel cell, and cells that consume electric current, such as plating and deposition cells	Lecture with dialogue and discussion	Quarterly and daily tests
18	2	Cell types	Electrical conductivity of weak and strong electrolyte solutions	Lecture with dialogue and discussion	Quarterly and daily tests
19	2	Electrical conductivity of solutions	Measurement of electrical conductivity of strong electrolytes	Lecture with dialogue and discussion	Quarterly and daily tests
20	2	Determine the equivalent conductivity of the strong electrolyte	Measurement of electrical conductivity of strong electrolytes	Lecture with dialogue and discussion	Quarterly and daily tests
21	2	Determine the	Measure electrical	Lecture with	Quarterly and

		equivalent conductivity when diluting to infinity	conductivity and determine the dissociation constant of the weak electrolyte	dialogue and discussion	daily tests
22	2	Determine the equivalent conductivity of succinic acid	Calculating the sonication rate constant for ethyl acetate using the electrical conductivity method	Lecture with dialogue and discussion	Quarterly and daily tests

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)	Dr. Nouri/Practical physical chemistry. Written by Khalifa Fayyad and Dr. Ammar Hani Al-Dujaili
Main references (sources)	Dr.. Omar Abdullah Al-Hazzazi Kinetic Physical Chemistry, Written by Ali Al-Tayyar, University of Baghdad (1989)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	P.W. Atkins Physical chemistry ninth edition 2010. Essentials of physical chemistry A Run Bahl B.S. Bahl G.D. Tull S. Chan company LTD. 2000. Darin J. Ulness ,Physical Chemistry I and II, Fall 2006 –2007

Course Description Form

1. Course Name:	Industrial chemistry
2. Course Code:	Chem.3.4
3. Semester / Year:	year
4. Description Preparation Date:	10-4-2025
5. Available Attendance Forms:	Attendance one lecture each week
6. Number of Credit Hours (Total) / Number of Units (Total)	60 hr/4 units
7. Course administrator's name (mention all, if more than one name)	Name: Assistant professor Sarah Saad Mohammed Jawad Email: saadnadeen@uosamarra.edu.iq
8. Course Objectives	

Course Objectives	-Students' knowledge of the petroleum products Part of the national wealth and the most important industries Petrochemical -Identify the most important obstacles and problems that occur In petrochemical industries such as corrosion Pollution, hard water, etc And how to treat it.
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9. Teaching and Learning Strategies

Strategy	-Cognitive objectives: To enable students to obtain the theoretical foundations of industrial chemistry, the definition of chemistry, The core of the basic concepts of the petroleum and petrochemical industries, students' knowledge Cape Chemical Company for petroleum components and raw materials in the petrochemical industries -Skills objectives: For the student to master the methods used in separating petroleum derivatives, distinguish between The raw materials and their quality used in the petrochemical industries, It distinguishes between types of glass in terms of quality, teaching the student the practical skills to purify water. Teaching and learning methods: 1- Lectures 2- Means of illustration, such as: the smart board. 3-Using colorful pictures and diagrams taken from Internet sites. -Emotional and valuable goals: 1- Adopting the method of dialogue between the student and the professor. 2- Adopting the discussion method
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1		Petroleum	Concept and origin of petroleum, theories that explain The origin of crude oil	lecture	Weekly and Monthly exams
2	2	Petroleum	Chemical composition of Crude oil , crude oil classification,Physical properties of crude oil	lecture	Weekly and Monthly exams
3	2	Petroleum	Processing crude oil and preparing it for refining	lecture	Weekly and Monthly exams
4	2	Petroleum	Physical,chemical and treatment of petroleum refining operations	lecture	Weekly and Monthly exams
5	2	Petroleum	Treatment and purification processes	lecture	Weekly and Monthly exams
6	2	Petroleum	The most important Petrochemical Industries such as:Athylene, Propene.....etc	lecture	Weekly and Monthly exams
7	2	Petroleum	The most important Petrochemical industries such as:Athylene, Propene.....etc	lecture	Weekly and Monthly exams

8	2	Petroleum	Aromatic materials as raw materials For petrochemical industries	lecture	Weekly and Monthly exams
9	2	Petroleum	Aromatic materials as raw materials For petrochemical industries	lecture	Weekly and Monthly exams
10	2	Petroleum	Halogen compounds In petrochemical industries	lecture	Weekly and Monthly exams
11	2	Petroleum	Halogen compounds In petrochemical industries	lecture	Weekly and Monthly exams
12	2	Exam	Exam	lecture	Weekly and Monthly exams
13	2	Petroleum	Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
14	2	Petroleum	Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
15	2	Petroleum	Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
16	2	Glass	Glass industry and his types	lecture	Weekly and Monthly exams
	2	Glass	Glass industry and his types	lecture	Weekly and Monthly exams
17	2	Corrosion	Corrosion in chemical industries	lecture	Weekly and Monthly exams
18	2	Corrosion	Corrosion in chemical industries	lecture	Weekly and Monthly exams
19	2	Corrosion	Explanation of corrosion theories	lecture	Weekly and Monthly exams
	2	Corrosion	Factors affecting corrosion And the important methods of eliminating corrosion	lecture	Weekly and Monthly exams
	2	Water	Water in industry	lecture	Weekly and Monthly exams
	2	Water	Hardship water and types of hardness And important ways to get rid of hardship	lecture	Weekly and Monthly exams
	2	Cement	Cement industry	lecture	Weekly and Monthly exams
	2	Exam	Exam	lecture	Weekly and Monthly exams
26	2	Pesticides	Characteristics, types of good pesticides and methods Getting rid of pests	lecture	Weekly and Monthly exams
27	2	sulfer	Sulfer and suluric acid	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
- Monthly exam for the first semester 20
- Daily exam for the first semester 3
- Oral exams for the first semester 2
- Monthly exam for the second semester 20
- Daily exam for the second semester 3
- Oral exams for the second semester 2
- annual quest50
- Final exam 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Industrial chemistry for the third stage
Main references (sources)	Industrial Chemistry - Dr. Jawad Kadhim Al-Khafaji and his group Industrial Chemistry - Dr. Omar Musa Ramadan and his group Introduction to industrial chemistry - Dr. Ali Ajam Industrial chemistry by Sheriff Catalysts
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	Biochemistry
2. Course Code:	Chem.3.5
3. Semester / Year:	Year
4. Description Preparation Date:	10/12/2025
5. Available Attendance Forms:	weekly
6. Number of Credit Hours (Total) / Number of Units (Total)	60 hours / 7 units
7. Course administrator's name (mention all, if more than one name)	

Name: Ass.prof.Dr.Nuha ali hadi

Email: noha62@@uosamarra.edu.iq

Name: Ali Sarhan Ibrahim Saleh

Email: ali_salih@uosamarra.edu.iq

8. Course Objectives

1. Study of the organic compounds found inside the living cell from a structural point of view.

2. Clarifying the basic concepts of biochemistry.

3. Develop students' skills in drawing the shapes of sugars, amino acids, and nucleic acids.

4. Explain the relationship between vitamins and the human body's needs and diseases associated with their deficiency.

9. Teaching and Learning Strategies

Strategy

1- Explanation and clarification.

2- Lecture method.

3- Discussion method.

10- The course structure

Evaluation method	Teaching method	outcomes Name of unit/or subject	Required learning	hours	week
Oral and exams	lecture	Biochemistry	Introduction to Biochemistry	2th	1
Oral and exams	lecture	Carbohydrates	Carbohydrates	2th	2
Oral and exams	lecture	Carbohydrates	Carbohydrates	2th	3
Oral and exams	lecture	Carbohydrates	Carbohydrates	2th	4
Oral and exams	lecture	Carbohydrates	Carbohydrates	2th	5
Oral and exams	lecture	Carbohydrates	Carbohydrates	2th	6
Oral and exams	lecture	lipid	lipid	2th	7
Oral and exams	lecture	lipid	lipid	2th	8
Oral and exams	lecture	lipid	lipid	2th	9
Oral and exams	lecture	lipid	lipid	2th	10
Oral and exams	lecture	Amino acids	Amino acids and peptides	2th	11
Oral and exams	lecture	Amino acids	Amino acids and peptides	2th	12
Oral and exams	lecture	Amino acids	Amino acids and peptides	2th	13
Oral and exams	lecture	Amino acids	Amino acids and peptides	2th	14
Oral and exams	lecture	Proteins	Proteins	2th	15
Oral and exams	lecture	<u>Proteins</u>	Proteins	2th	16
Oral and exams	lecture	Nucleic acids	Nucleic acids and nucleotides	2th	17
Oral and exams	lecture	Nucleic acids	Nucleic acids and nucleotides	2th	18
Oral and exams	lecture	Enzymes	Enzymes	2th	19
Oral and exams	lecture	<u>Enzymes</u>	Enzymes	2th	20
Oral and exams	lecture	<u>Enzymes</u>	Enzymes	2th	21
lecture	lecture	Vitamins	Vitamins	2th	22

lecture	lecture	<u>Vitamins</u>	Vitamins	2th	23
lecture	lecture	<u>Vitamins</u>	Vitamins	2th	24
lecture	lecture	<u>Hormones</u>	Hormones	2th	25
lecture	lecture	<u>Hormones</u>	Hormones	2th	26
lecture	lecture	<u>Hormones</u>	Hormones	2th	27
lecture	lecture	<u>Hormones</u>	Hormones	2th	28
13. Course Evaluation					
- Semester exam (theory 35 + practical 15) = 50% - 2. Final exam (theoretical 35 + practical 15) = 50%					
14. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Biochemistry / Dr. Talal Al-Najfi Introduction to Biochemistry / Dr. Khawla Al-Falih		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Biochemistry / Part One / Dr. Tariq Younis Mahmoud - Dr. Luay Abdul Ali Al-Hilali / Ministry of Higher Education and Scientific Research / University of Mosul		
Electronic References, Websites					

Course Description Form

1. Course Name:	Biochemistry practical /third stage
2. Course Code:	Chem.3.5.P.
3. Semester / Year:	Year
4. Description Preparation Date:	2026/1/7
5. Available Attendance Forms:	Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)	90/7
7. Course administrator's name (mention all, if more than one name)	Name: Dr. Rana Raad Zanzal Email: rana.r.zanzal@uosamarra.edu.iq Name: Dr. Maytham Mohammad Bakr Email: maitham.m@uosamarra.edu.iq Name: Dr. wafaa Nsaif Email: wafaa.nsaif@uosamarra.edu.iq Name: Dr.Abbas Maan Abbas Email: abbas.m@uosamarra.edu.iq

Name: Zainab Hussain Ali **Email: zainab.hu.a@uosamarra.edu.iq**
Name: Ai Sarhan Ibrahim **Email: ali-saih@uosamarra.edu.iq**
Name: Mahasen Raad Mahmood **Email: mahasen.ra.ma@uosamarra.edu.iq**
Name: Sama Ai Hussain **Email: eduhm230038@uosamarra.edu.iq**

8. Course Objectives

- Study basic laboratory tests for carbohydrates, fats, and proteins.
- Study some practical tests in clinical biochemistry

9. Teaching and Learning Strategies

Strategy	- Lectures - Use of laboratory materials and measuring devices - Reports - Exams
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	An hour for each group	-Carbohydrates and their types -Detection of monosaccharides (dissolution detection and Molisch detection).	Laboratory carbohydrate tests	Laboratory	Weekly exams, laboratory and monthly reports
Second	An hour for each group	-General tests for carbohydrate detection (Silvanov detection)	=	Laboratory	Weekly exams, laboratory and monthly reports
Third	An hour for each group	Bial detection	=	Laboratory	Weekly exams, laboratory and monthly reports
Fourth	An hour for each group	What is meant by oxidation of sugars? Fahlanck detection	Oxidation of sugars	Laboratory	Weekly exams, laboratory and monthly reports
Fifth	An hour for each group	Benedict detection	=	Laboratory	Weekly exams, laboratory and monthly reports
Sixth	An hour for each group	Parvoid detection	=	Laboratory	Weekly exams, laboratory and monthly reports
Seventh	An hour for each group	-What are disaccharides? -The most important sugars found in nature	Disaccharides	Laboratory	Weekly exams, laboratory and monthly reports

		-Detection of hydrolysis of disaccharides			
Eighth	An hour for each group	What is meant by polysaccharides? Explain the importance of some types of polysaccharides Iodine detection	Polysaccharides	Laboratory	Weekly exams, laboratory and monthly reports
Ninth	An hour for each group	Detection of hydrolysis of polysaccharides Detection of unknown materials	=	Laboratory	Weekly exams, laboratory and monthly reports
tenth	An hour for each group	Explain what fat means and what are its classifications and characteristics Conduct a solubility experiment	Fats	Laboratory	Weekly exams, laboratory and monthly reports
Eleventh	An hour for each group	Acrolein experiment and cholesterol detection	=	Laboratory	Weekly exams, laboratory and monthly reports
Twelfth	An hour for each group	Detection of saturated and unsaturated fatty acids Lecithin extraction test	=	Laboratory	Weekly exams, laboratory and monthly reports
Thirteenth	An hour for each group	Experiment to separate the three main types of fats	=	Laboratory	Weekly exams, laboratory and monthly reports
Fourteenth	An hour for each group	Explaining proteins, their levels, and the physical and chemical properties of proteins. Amphoteric properties of proteins	Proteins	Laboratory	Weekly exams, laboratory and monthly reports
Fifteenth	An hour for each group	Ninhydrin detection Xanthoprotec detection Hopkins Cole detection	Colorimetric detection of amino acids	Laboratory	Weekly exams, laboratory and monthly reports
Sixteenth	An hour for each group	Rosenheim revealed Sulfur detection	=	Laboratory	Weekly exams, laboratory and monthly

		Biuret detection			reports
Seventeenth	An hour for each group	Blood glucose	Some practical tests in clinical biochemistry	Laboratory	Weekly exams, laboratory and monthly reports
Eighteenth	An hour for each group	Blood cholesterol	=	Laboratory	Weekly exams, laboratory and monthly reports
Nineteenth	An hour for each group	Blood Urea	=	Laboratory	Weekly exams, laboratory and monthly 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)	Practical Biochemistry. / Dr. Riyad Rashid Suleiman a. Youssef George Fadlallah
Main references (sources)	Lippincott biochemistry
Recommended books and references (scientific journals, reports...)	Molecular and cell biology -Biochemistry by Stryer
Electronic References, Websites	Principles of biochemistry with human focus by Reginald H. Garrett-Essential biochemistry by Charlotte W. Pratt

Course Description Form

1. Course Name :	
Optional / Stage 3	
2. Course Code :	
chem.3.6.	
3. Semester / Year :	
year	
4. Description Preparation Date :	
14/12/2025	
5. Available Attendance Forms :	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name : Teacher. Huda mutar Ibrahim Email : Huda.mutar@uosamarra.edu.iq	
8. Course Objectives	
Course Objectives	Study of environmental pollution and its types

	How changes in the environment and other species affect the structure of society, including natural disasters, climate change, and others. Human Environment: Human activity and its impact on the Earth and the ecosystems within it are closely related to the impact on climate and its change.
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9. Teaching and Learning Strategies

Strategy	Lectures and adopting educational discussion, Awareness and education visits to chemical laboratories and conducting some exercises related chemical safety and others.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theoretical Lecture	Environmental Pollution Concept	Introduction to environmental pollution	Lecture And discussion	Examinations
2	1 Theoretical Lecture	Causes of pollution	Introduction to environmental pollution	Lecture And discussion	Examinations
3	1 Theoretical Lecture	Degrees of Ecological Pollution	Introduction to environmental pollution	Lecture And discussion	Examinations
4	1 Theoretical Lecture	Pollutants Classification	Introduction to environmental pollution	Lecture And discussion	Examinations
5	1 Theoretical Lecture	Environmental Pollution Types	Introduction to environmental pollution	Lecture And discussion	Examinations
6	1 Theoretical Lecture	Concentration of Pollution	Introduction to environmental pollution	Lecture And discussion	Examinations
7	1 Theoretical Lecture	Persistency	Introduction to environmental pollution	Lecture And discussion	Examinations
8	1 Theoretical Lecture	Life discrimination	Introduction to environmental pollution	Lecture And discussion	Examinations
9	1 Theoretical Lecture	Some international organizations concerned with the environment:	Introduction to environmental pollution	Lecture And discussion	Examinations
10	1 Theoretical Lecture	Atmosphere	Atmosphere	Lecture And discussion	Examinations
11	1 Theoretical Lecture	Atmosphere Layers	Atmosphere	Lecture And discussion	Examinations
12	1 Theoretical Lecture	Air Components	Atmosphere	Lecture And discussion	Examinations
13	1 Theoretical Lecture	Emergence of Gases	Atmosphere	Lecture And discussion	Examinations
14	1 Theoretical Lecture	Air Pollution	Atmosphere	Lecture And discussion	Examinations
15	1 Theoretical Lecture	Air Pollution Sources	Atmosphere	Lecture And discussion	Examinations
16	1 Theoretical Lecture	Air Pollution Types	Atmosphere	Lecture And discussion	Examinations
17	1 Theoretical Lecture	Air Pollutants	Working using chemicals	Lecture And discussion	Examinations

18	1 Theoretical Lecture	10Particulate Matter (PM	Working using chemicals	Lecture And discussion	Examinations
19	1 Theoretical Lecture	Classification of particulate matter	Atmosphere	Lecture And discussion	Examinations
20	1 Theoretical Lecture	Techniques for Controlling Particulate Matter :	Air pollution	Lecture And discussion	Examinations
21	1 Laboratory visit	Heat Trapping	Air pollution	Lecture And discussion	Examinations
22	1 Theoretical Lecture	Acid Rains	Air pollution	Lecture And discussion	Examinations
23	1 Theoretical Lecture	Suggested Solutions for Air Pollution	Air pollution	Lecture And discussion	Examinations
24	1 Theoretical Lecture	Sustainable Development	Air pollution	Lecture And discussion	Examinations
25	1 Theoretical Lecture	Renewable, Alternative or Green Energy	Air pollution	Lecture And discussion	Examinations
26	1 Theoretical Lecture	Radioactive Pollution	Radioactive Pollution	Lecture And discussion	Examinations
27	1 Theoretical Lecture	Radial Types	Radioactive Pollution	Lecture And discussion	Examinations
28	1 Theoretical Lecture	Half-life time	Radioactive Pollution	Lecture And discussion	Examinations
29	1 Theoretical Lecture	(Noise Pollution)	(Noise Pollution)	Lecture And discussion	Examinations
30	1 Theoretical Lecture	Soil pollution	Fertilizers and pesticides	Lecture And discussion	Examinations

11. Course Evaluation

- **Daily exam + first semester exam (25 deg.)**
- **Daily exam + second semester exam (25 deg.)**
- **final exam (50 deg.)**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:					
Research methodology					
2. Course Code:					
Chem.3.8					
3. Semester / Year:					
year					
4. Description Preparation Date:					
15-12-2025					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hours /2 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Mohammed dahham humeedy Email: mohamed.d.h@uosamarra.edu.iq					
8. Course Objectives					
		- Identify the concept of scientific research and its characteristics. - Identify the objectives of scientific research. - Identify the stages and steps of preparing scientific research. - Identify the types of scientific research. - Identify the elements of a scientific research plan.			
9. Teaching and Learning Strategies					
Strategy		- Lectures. - Demonstration means such as the smart board.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	2	The student should understand what research is.	What is meant by scientific research and its characteristics.	Lecture	Weekly and monthly
3-4	2	The student should know the purpose of writing the research.	Scientific research objectives	Lecture	Weekly and monthly
5-6	2	The student should know the stages of preparing the research.	Stages and Preparation of Scientific Research	Lecture	Weekly and monthly

7-8	2	The student should know how to prepare a research plan.	Scientific Research Plan and Its Elements	Lecture	Weekly and monthly
9-10	2	Identify the research problem.	Research Problem and Questions	Lecture	Weekly and monthly
11-12	2	How to write the introduction to the research.	Research Introduction	Lecture	Weekly and monthly
13-14	2	The student should know how to formulate the importance of the research.	Research Importance	Lecture	Weekly and monthly
15-16	2	The student should know the types of research limitations.	Research Limitations	Lecture	Weekly and monthly
17-18	2		First Semester Exam	Lecture	Weekly and monthly
19-20		The student should know the research tool and its requirements.	Research Tool and Conditions		
21-22	2	The student should know the types of statistical treatments for research.	Statistical Processing	Lecture	Weekly and monthly
23-24	2	The student should know how to formulate research results.	Research Results and Conditions	Lecture	Weekly and monthly
25-26	2	The student should know how to formulate proposals and recommendations.	Suggestions and Recommendations	Lecture	Weekly and monthly
27-28	2	The student should know the types of references.	Bibliography	Lecture	Weekly and monthly
29-30	2	The student should know the types of sources.	Types of Sources	Lecture	Weekly and monthly
31-32	2	The student should know how to document sources.	Types of Source Documentation	Lecture	Weekly and monthly

33-34	2	The student should know the structure of the research.	General Structure of Scientific Research	Lecture	Weekly and monthly
35-36		Examiner	Final exam		

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
- Monthly exam for the first semester 17
- Daily exam for the first semester 4
- Oral exams for the first semester 4
- Monthly exam for the second semester 17
- Daily exam for the second semester 4
- Oral exams for the second semester 4
- Annual quest 50
- final exam 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Scientific Research Methodology, authored by Saad Salman Al-Mashhadani, 2019
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Forth stage

Course Description Form

1. Course Name:					
Identification of Organic Compounds /fourth stage					
2. Course Code:					
Chem.4.1.					
3. Semester / Year:					
year					
4. Description Preparation Date:					
22/1/2026					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hours/7					
7. Course administrator's name (mention all, if more than one name)					
Name: Assist. Professor Dr. Maha Salih Hussein Email: Maha.s56@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives	Identifying the composition of organic compounds spectroscopically by study M.S., NMR, IR, and UV spectra and identifying unknown organic substances the laboratory by conducting laboratory tests.				
9. Teaching and Learning Strategies					
Strategy	The student's knowledge of organic identification methods and problem solve through theoretical lectures and laboratory scientific experiments, with student being evaluated through practical and oral exams and monthly exams.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	2 theoretical + 3 practical	Electromagnetic radiation and the ultraviolet spectrum UV	Introduction Electromagnetic radiation and	Lecture + laboratory	Weekly and monthly exams and laboratory reports
2.	2 theoretical + 3 practical	UV	the ultraviolet spectrum ,solvent effect Factors affecting location absorption bands	Lecture + laboratory	Weekly and monthly exams and laboratory reports
3.	2 theoretical + 3 practical	UV	Woodward-Fieser rules For dienes	Lecture + laboratory	Weekly and monthly exams and laboratory reports
4.	2 theoretical +	UV	carbonyl	Lecture	Weekly and

	3 practical		compounds-enones	+ laboratory	monthly exams and laboratory reports
5.	2 theoretical + 3 practical	UV	Benzene and derivatives	Lecture + laboratory	Weekly and monthly exams and laboratory reports
6.	2 theoretical + 3 practical	UV	Examples exercises	Lecture + laboratory	Weekly and monthly exams and laboratory reports
7.	2 theoretical + 3 practical	Infrared I.R	General introduction of I. R	Lecture + laboratory	Weekly and monthly exams and laboratory reports
8.	2 theoretical + 3 practical	Infrared I.R	theory kinds of vibration	Lecture + laboratory	Weekly and monthly exams and laboratory reports
9.	2 theoretical + 3 practical	Infrared I.R	Effective groups, absorption bands and their location in the spectrum	Lecture + laboratory	Weekly and monthly exams and laboratory reports
10.	2 theoretical + 3 practical	Infrared I.R	Analysis and interpretation of IR spectra	Lecture + laboratory	Weekly and monthly exams and laboratory reports
11.	2 theoretical + 3 practical	Infrared I.R	Frequencies of groups in organic compounds (alkanes, alkenes, alkynes)	Lecture + laboratory	Weekly and monthly exams and laboratory reports
12.	2 theoretical + 3 practical	Infrared I.R	Aromatic compounds, alcohols and ethers, ketones and aldehydes,	Lecture + laboratory	Weekly and monthly exams and laboratory reports
13.	2 theoretical + 3 practical	Infrared I.R	Carboxylic acids, esters and lactones, acid anhydrides, acid halides, amides	Lecture + laboratory	Weekly and monthly exams and laboratory reports
14.	2 theoretical + 3 practical	Infrared I.R	Amines, amino acids and them salts, nitriles, nitro	Lecture + laboratory	Weekly and monthly exams and laboratory

			compounds, organic halogen compounds		reports
15.	2 theoretical + 3 practical	Infrared I.R	Exercises and examples	Lecture + laboratory	Weekly and monthly exams and laboratory reports
16.	Monthly exam (first semester)				
17.	2 theoretical +	NMR spectrum ¹ H NMR	General introduction and theory	Lecture + laboratory	Weekly and monthly exams and laboratory reports
18.	2 theoretical + 3 practical	¹ H NMR	Measurement method, suitable solvent and TMS reference specifications	Lecture + laboratory	Weekly and monthly exams and laboratory reports
19.	2 theoretical + 3 practical	¹ H NMR	Chemical shift and equivalent protons	Lecture + laboratory	Weekly and monthly exams and laboratory reports
20.	2 theoretical + 3 practical	¹ H NMR	Factors affecting chemical shift	Lecture + laboratory	Weekly and monthly exams and laboratory reports
21.	2 theoretical + 3 practical	¹ H NMR	Splitting of resonance (spin-spin coupling), integration ratio ,J coupling	Lecture + laboratory	Weekly and monthly exams and laboratory reports
22.	2 theoretical + 3 practical	¹ H NMR	Analysis and interpretation of ¹ H NMR	Lecture + laboratory	Weekly and monthly exams and laboratory reports
23.	2 theoretical + 3 practical	¹ H NMR	Exercises and examples	Lecture + laboratory	Weekly and monthly exams and laboratory reports
24.	Monthly exam (second semester)				
25.	2 theoretical + 3 practical	Mass spectrum M.S	Mass spectrum and determination of molecular formula	Lecture + laboratory	Weekly and monthly exams and laboratory reports
26.	2 theoretical +	M.S	Molecular ion	Lecture	Weekly and

	3 practical		and fragmentation	+ laboratory	monthly exams and laboratory reports
❖ Application period in schools					
11. Course Evaluation					
- Monthly theoretical exam for the first semester 12.5 - Monthly practical exam for the first semester 12.5 - Monthly theoretical exam for the second semester 12.5 - Monthly practical exam for the second semester 12.5 - Final exam 50					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Fleming, Ian, and Dudley H. Williams. <i>Spectroscopic methods in organic chemistry</i> . New York: McGraw-hill 6th ed.,2007.		
Main references (sources)			- R. Silverstein, F. Webster and D. Kiemle, "Spectrometric Identification of Organic Compounds", 7th Ed., John Wiley and Sons,Inc., New York (2005). - Carey, Francis A., and Richard J. Sundberg. <i>Advanced organic chemistry: part A: structure and mechanisms</i>. Springer Science & Business Media, 2007.		
Recommended books and references (scientific journals, reports...)			Using modern sources and examples of organic compounds measured with modern devices		

Course Description Form

1. Course Name:	Identification of Organic Compounds / Practical
2. Course Code:	Chem.4.1.P
3. Semester / Year:	year
4. Description Preparation Date:	22-1-2026
5. Available Attendance Forms:	Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)	90hours /7 Units

7. Course administrator's name (mention all, if more than one name)

Name: Mohammed dahham humeedy

mohamed.d.h@uosamarra.edu.iq

8. Course Objectives

- Identify the steps to diagnose an unknown organic compound through specific steps that you have proven.
- Know how organic compounds are diagnosed by physical constants.
- Know how to diagnose organic compounds by detecting active aggregates by public and private disclosures.
- Know how to diagnose organic compounds through spectral detections.
- Know how to diagnose organic compounds by preparing an unknown organic compound derivative.

9. Teaching and Learning Strategies

Strategy

- Lectures.
- Demonstration means such as the smart board.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Recognize what is organic diagnosis	Introduction to Organic Diagnosis	Lecture and Show video	Weekly and monthly
Second	2	Steps to identify an aerator of an unknown organic compound	Identify an unknown organic compound by the systematic method		Weekly and monthly
Third	2	Identify the importance of melting and boiling points in the identification and identification of an unknown organic compound	Physical constants of an unknown organic compound	Lecture and Show video	Weekly and monthly
Fourth	2	The importance of physical examination to know the unknown organic compound	Physical examination of the unknown	Lecture and Show video	Weekly and monthly
Fifth	2	The importance of combustion test in determining the organic compound if it is aromatic or non-aromatic	Combustion Test	Lecture and Show video	Weekly and monthly
Sixth	2	The importance of determining the solubility class to know the identity of	Determination of solubility class for an unknown organic	Lecture and Show video	Weekly and monthly

		the organic compound	compound		
Seventh	2	know whether an organic compound contains elements such as N,S,X,	Analysis of elements (detection of nitrogen, sulfur and halogens)	Lecture and Show video	Weekly and monthly
Eighth	2	Exam	First Semester Exam	Lecture and Show video	Weekly and monthly
Ninth	2	Detection of active aggregates of organic compound	Detection of functional aggregates	Lecture and Show video	Weekly and monthly
tenth	2	How to detect unsaturated organic compounds	Detection of double bond	Lecture and Show video	Weekly and monthly
Eleventh	2	Alcohol detection method	Alcohol detection	Lecture and Show video	Weekly and monthly
Twelfth	2	Method of detecting aldehydes and ketones	Detection of aldehydes and ketones	Lecture and Show video	Weekly and monthly
Thirteenth	2	Method of detecting carboxylic acids	Detection of carboxylic acids	Lecture and Show video	Weekly and monthly
Fourteenth	2	Method of detecting amine	Amine Detection	Lecture and Show video	Weekly and monthly
Fifteenth	2	Method of detecting amides	Detection of amides	Lecture and Show video	Weekly and monthly
Sixteenth	2	Method of detecting phenols	Phenols Detection	Lecture and Show video	Weekly and monthly
Seventeenth	2	Method of detecting ester	Ester detection	Lecture and Show video	Weekly and monthly
Eighteenth	2	Method of detecting Nitro Group	Nitro Group Detection	Lecture and Show video	Weekly and monthly
Nineteenth	2	Method of detecting Ethers	Ethers detection	Lecture and Show video	Weekly and monthly
Twenty	2	Method of detecting Nitrilatal	Nitrilatal Detection	Lecture and Show video	Weekly and monthly
Twenty-first	2	Examiner		Lecture and Show video	Weekly and monthly
Twenty-second	2	How to prepare a derivative of an unknown organic compound	Examiner Chapter Two	Lecture and Show video	Weekly and monthly
Twenty-third	2	Knowledge and diagnosis of the organic compound	Preparation of the derivative of the	Lecture and Show	Weekly and

			unknown organic compound,	video	monthly
Twenty-fourth Twenty-eighth-	2	unknown		Lecture and Show video	Weekly and monthly
		Examiner	Final exam		
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 - Monthly exam for the first semester 8.5 - Daily exam for the first semester 2 - Oral exams for the first semester 2 - Monthly exam for the second semester 8.5 - Daily exam for the second semester 2 - Oral exams for the second semester 2 - Annual quest 25 - final exam 25					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Organic and natural diagnosis Abdul-Jabbar Mukhles		
Main references (sources)			Identification of organic Silverstein and Bassler		
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1. Course Name:	Biochemistry- 4 th class
2. Course Code:	Chem.4.2.
3. Semester / Year:	Year
4. Description Preparation Date:	13-1-2026
5. Available Attendance Forms:	Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)	60/4
7. Course administrator's name (mention all, if more than one name)	

Name: Othman Rashis Hameed Othmansamarrai@uosamarra.edu.iq

Rana Raad Zanzal rana.r.zanzal@uosamarra.edu.iq

Zainab Hussain Ali zainab.hu.a@uosamarra.edu.iq

8. Course Objectives

Course Object Study of the biological metabolism of carbohydrates, lipids, and proteins, as well as the study of genetic information.

9. Teaching and Learning Strategies

Strategy

Cognitive objectives

1. Enable the student to obtain theoretical knowledge of life chemistry
2. The student's knowledge of the basic concepts of life management
3. The student's knowledge of the components and composition carbohydrates, proteins, fats and acids. Lamina

The skill objectives of the course

1. The student masters the statements of carbohydrates and proteins efficiently.
 2. Distinguishing between nuclear acids and the role of each of them
 3. Distinguishing between types of fats, their composition and functions
 4. Distinguishing between the compounds entering and resulting from the biological metabolism of carbohydrates and Proteins and fats
1. Lectures
 2. Illustration means, such as: the smart board.
 3. E-learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Life energy	Life energy	lecture	Weekly and monthly exams
Second	2	Life energy	Life energy	lecture	Weekly and monthly exams
Third	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
Fourth	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
Fifth	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
Sixth	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
Seventh	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
Eighth	2	metabolism	Carbohydrate	lecture	Weekly and

			metabolism		monthly exams
Ninth	2	exam	exam	lecture	Weekly and monthly exams
tenth	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
Eleventh	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
Twelfth	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
Thirteenth	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
Fourteenth	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
Fifteenth	2	exam	exam	lecture	Weekly and monthly exams
Sixteenth	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
Seventeenth	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
Eighteenth	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
Nineteenth	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
Twenty	2	exam	exam	lecture	Weekly and monthly exams
Twenty-first	2	Genetic information	Genetic information	lecture	Weekly and monthly exams
Twenty-second	2	Genetic information	Genetic information	lecture	Weekly and monthly exams
Twenty-third	2	exam	exam	lecture	Weekly and monthly exams
Twenty-fourth	2	test	test	lecture	Weekly and monthly exams
11. Course Evaluation					
- Course exams 60 - Week exams 20 - Reports 10 - Remarkable participations 10					
12. Learning and Teaching Resources					

Required textbooks (curricular books, if any)	الكيمياء الحياتية/ د. طلال النجفي مدخل الى الكيمياء الحياتية/ د. خولة ال فليح الكيمياء الحياتية الفلسفية/ د. سامي المظفر الكيمياء الحياتية/ د. طارق يونس
Main references (sources)	Lehninger principles of biochemistry -Biochemistry by Mathews -Lippincott biochemistry
Recommended books and references (scientific journals, reports...)	Molecular and cell biology -Biochemistry by Stryer -Harpers of biochemistry
Electronic References, Websites	- Principles of biochemistry with human focus by Reginald H.Garrett -Essential biochemistry by Charlotte W. Pratt Biochemistry by Dummies

Course Description Form

1. Course Name:	
Analytical chemistry	
2. Course Code:	
Chem.4.3.	
3. Semester / Year:	
Year 2025-2026	
4. Description Preparation Date:	
20-1-2026	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
120/7	
7. Course administrator's name (mention all, if more than one name)	
Name: Doctor teacher Baidaa Adnan Jassim	
8. Course Objectives	
It aims to qualify students to have a comprehensive perspective that combines theoretical understanding with practical skills in using modern analytical tools and solving complex problems	
9. Teaching and Learning Strategies	
Strategy	Using whiteboards, blended learning tools, and the laboratory

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theoretical + 2 Practical	Automated analysis	Analytical Chemistry and the Concept of Automated analysis	Lecture as Reactive discussion + lab	Weakly and course exams
2	2 theoretical + 2 Practical	Electromagnetic radiation	Instrumental Chemistry	Lecture as Reactive discussion + lab	Weakly and course exams
3	2 theoretical + 2 Practical	Electromagnetic radiation	The Photovoltaic Effect	Lecture as Reactive discussion + lab	Weakly and course exams
4	2 theoretical + 2 Practical	Electromagnetic radiation	The polarization of light and optical efficiency	Lecture as Reactive discussion + lab	Weakly and course exams
5	2 theoretical + 2 Practical	Absorption, fluorescence and phosphorescence	Absorption of atomic and molecular radiation, fluorination, and phosphorization	Lecture as Reactive discussion + lab	Weakly and course exams
6	2 theoretical + 2 Practical	Quantitative analysis	Quantitative analysis by absorption of radiation	Lecture as Reactive discussion + lab	Weakly and course exams
7	2 theoretical + 2 Practical	Quantitative analysis	Lambert-Beer's law	Lecture as Reactive discussion + lab	Weakly and course exams
8	Exam				
9	2 theoretical + 2 Practical	Spectroscopy	spectroscopic measuring instruments, their constituents, and sources of radiant	Lecture as Reactive discussion + lab	Weakly and course exams

			energy		
10	2 theoretical + 2 Practical	Spectroscopy	Wavelength Controllers and Types + Detectors and Types	Lecture as Reactive discussion + lab	Weakly and course exams
11	2 theoretical + 2 Practical	Spectroscopy	Examples of colorimetric and spectroscopic measuring instruments	Lecture as Reactive discussion + lab	Weakly and course exams
12	2 theoretical + 2 Practical	Spectroscopy	Applications of Absorption Measurements in ultraviolet and visible spectroscopy	Lecture as Reactive discussion + lab	Weakly and course exams
13	2 theoretical + 2 Practical	Spectroscopy	Quantitative Analysis and Its Applications	Lecture as Reactive discussion + lab	Weakly and course exams
14	2 theoretical + 2 Practical	Scattering and Turbidity	Analysis by Measuring Scattering and Turbidity	Lecture as Reactive discussion + lab	Weakly and course exams
15	Exam				
16	2 theoretical + 2 Practical	Infrared Absorption Spectroscopy	Analysis by Infrared Spectroscopy	Lecture as Reactive discussion + lab	Weakly and course exams
17	2 theoretical + 2 Practical	Infrared Absorption Spectroscopy	Qualitative and Quantitative Analysis Using IR Spectroscopy	Lecture as Reactive discussion + lab	Weakly and course exams
18	2 theoretical + 2 Practical	Atomic Spectroscopy	Atomic Absorption	Lecture as Reactive discussion + lab	Weakly and course exams
19	2 theoretical + 2 Practical	Atomic Absorption	Absorption of Radiant Energy by Atoms	Lecture as Reactive discussion + lab	Weakly and course exams

20		School applications			
21		School applications			
22		School applications			
23		School applications			
24		School applications			
25		School applications			
26	2 theoretical + 2 Practical	Atomic Absorption	Quantitative Analysis by Atomic Absorption	Lecture as Reactive discussion n + lab	Weakly and course exams
27	2 theoretical + 2 Practical	Atomic Spectroscopy	Atomic Emission and Its Important Factors	Lecture as Reactive discussion n + lab	Weakly and course exams
28	2 theoretical + 2 Practical	Electrochemical Analysis	The Concept of Electroanalytical Chemistry	Lecture as Reactive discussion n + lab	Weakly and course exams
29	2 theoretical + 2 Practical	Potentiometric Measurements	The Concept of Potentiometric Measurement	Lecture as Reactive discussion n + lab	Weakly and course exams
30	Exam				
11.Course Evaluation					
- Daily exam + first month exam: 25 - Daily exam + second month exam: 25 - Final exam: 50					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Instrumental Chemical Analysis: Written Prof. Dr. Abdul Mohsen Abdul Hamid Al-Haidari		
Main references (sources)			Instrumental Chemical Analysis: Written by Prof. Dr. Abdul Mohsen Abdul Hamid Al-Haidari		
Recommended books and references (scientific journals, reports...)			1- Skoog D.; West d. Holler F. and Crouch S. "Fundamental of Analytical Chemistry" ninth Ed.Thomson, USA. 2014.		

Electronic References, Websites	-Daniel C. Harris, "Quantitative Chemical Analysis" Eighth Ed. Freeman and Company New York. 2010. التحليل الكميائي الكمي - Hage D.; Carr J. "analytical Chemistry d quantitative analysis" international Ed. Person, USA, 2011. الكيمياء التحليلية والتحليل الكمي
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Course Description Form

1. Course Name:					
Industrial chemistry					
2. Course Code:					
Chem.4.4.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
9/12/2025					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60/7					
7. Course administrator's name (mention all, if more than one name)					
Name:Assistant proff. Dr. Taiseer Abdul-Kader Saleh Email: taiseer@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives		Studying of polymerization system for different polymers ,their preparat methods ,their classification, study of their features and most import industrial polymers			
9. Teaching and Learning Strategies					
Strategy		- Lectures - Legends like boards and data show - Using colored pictures , diagrams and videos from internet			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2Theoretical	Introduction to polymers	Learning about industrial chemistry	Lecture	Daily,weekly and monthly exams with reports
2	=	Polymers Technology	Concept of polymerization, polymerization and M.W of polymers	=	=

3	=	Classification of Polymers	Natural polymers ,synthesis polymers ,linear and branch polymers	=	=
4	=	Nomenclature of polymers	Naming according to the source ,industrial naming and IUPAC naming	=	=
5	=	Polymers molecular force	Chemical and physical forces between monomers	=	=
6	=	Physical properties polymers	Tg , Tm and influencing Factors on it	=	=
7	=	Polymerization processes	Polymerization system	=	=
8	=	Classification of polymer reaction	Addition polymerization : 1 – free radical	=	=
9	=	Addition Polymerization	Ionic polymerization (Anionic , cataionic)	=	=
10	=	Examination	Exam	=	Exam
11	=	Classification polymerization reaction	Condensation Polymerization	=	Daily ,weekly and monthly exams with reports
12	=	Classification industrial polymers	Important industrial Polymers(Step growth polymers)	=	
13	=	Condensation copolymers	Types of copolymers	=	
14	=	Preparation copolymers	Preparation of condensation polymers	=	=
15	=	Cyclic polymerization	Polymerization of cyclic monomers by cycle opening	=	=
16	=	Polymerization process and its conditions	Homogeneous and heterogeneous Polymerization	=	=
17	=	Addition polymerization	Coordinating polymerization	=	=
18	=	Methods of polymers	Number Average M.W ,	=	=

19	=	M.W. calculation Thermal transition states of polymers	weight average M.W. and Viscosity average M.W. Thermal transition states of polymers at high and low temperature and Tg	=	=
20	=	Examination	exam	=	Exam
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)			Chemistry of Macromolecule		
Main references (sources)			Polymer chemistry , Sebastian Koltzenburg , Michael Maskos, Oscar Nuyken		
Recommended books and references (scientific journals, reports...)			1. Polymer Science , V.R. Gowariker, N. V. Viswanathan and J. Sreedhar, , (1987), John Wiley & Sons, Inc. 2. Polymer Chemistry, Alka Gupta, (2010), pragati Prakashan, New Delhi. 3. Principles of Polymerization, George Odian, Fourth Edition, (2004), John Wiley & Sons, Inc.		
Electronic References, Websites			Industrial Chemistry , Helen Njeri Njenga, (2010), African Virtual University		

Course Description Form

1. Course Name:	Industrial chemistry- practical
2. Course Code:	Chem.4.4.P.
3. Semester / Year:	Year
4. Description Preparation Date:	9/12/2025
5. Available Attendance Forms:	weekly

6. Number of Credit Hours (Total) / Number of Units (Total)					
90/7					
7. Course administrator's name (mention all, if more than one name)					
Name: Lacturer Ahmed Khalid Hussein Email: ahmed.kh@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives	Studying of polymerization system for different polymers, th preparation methods ,their classification, study of their features and m important industrial polymers				
9. Teaching and Learning Strategies					
Strategy	1-Laboratory 2- Teaching aids such as chalkboards, displays, glassware, chemicals, and laboratory equipment				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3Practi	Introduction to polymers	Learning about industr chemistry	Lecture	Daily,week and monthly exa
2	=	Petroleum distillation	Recognize the types of petroleum	Lab	=
3	=	Preparing a surfactant	Recognize hydrophilic hydrophobic materials	=	=
4	=	Preparing the soap	Recognize how soap wor	=	=
5	=	Finding the ratio of free fatty acids in soap	Knowing the percentage soap making process	=	=
6	=	Extracting oils from plant materials	Recognize and optimize extraction process	=	=
7	=	Preparation of di- and tri- cellulose acetate	Know the types of cellul acetate	=	=
8	=		Exam	=	
9	=	Exam		=	

		Preparation of phenol-formaldehyde resin	Knowing how to prepare polymers		=
	=			=	
10		Prepare toothpaste			Exam
	=		Recognize ways to prepare some materials for personal use	=	
11		Prepare the labels	Familiarize yourself with preparation method and adhesion forces		Daily, weekly and monthly exam with report
	=	Detecting caustic soda in soap	Know the effect of low and high levels of caustic soda on the skin	=	
12		Preparing and purifying some dyes	Finding an azo group in laboratory		=
	=			=	
13		Fibers dyeing	Use of prepared dyes in dyeing processes		=
	=				
14		Preparation of phenolphthalein indicator	It is used to detect the presence of some substances	=	=
	=			=	
15		Exam	Exam		=
				=	
16	=			=	=
	=				=

	=				Exam
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)			Industrial chemistry experiments prepare by professors at the University of Baghdad Ibn Al-Haytham College of Pure Sciences		
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1 Course Name:	
Quantum chemistry and spectroscopy /fourth stage	
2 Course Code:	
Chem.4.5.	
3 Semester / Year:	
annually	
4 Description Preparation Date:	
7/1/2026	
5 Available Attendance Forms:	
weekly	
6 Number of Credit Hours (Total) / Number of Units (Total):	
60 hours/4 units	
7 Course administrator's name (mention all, if more than one name)	
Name :Dr. Hassan faisal Mohammed Email: mohammed.m@uosamarra.edu.iq	
8 Course Objectives	
Course Objectives	Learn about ancient and modern quantum theory and the hypotheses of wave quantum mechanics. And its application to the hydrogen atom
9 Teaching and Learning Strategies	

Strategy	A- Cognitive objectives A-1 The student's knowledge of modern quantum theory A-2 Introducing the student to the hypotheses of quantum theory A-3 The student's knowledge of some models applied to modern quantum theory B - The skill objectives of the course 1 - The student must master some mathematical skills in order to find solutions to some problems 2- To memorize the hypotheses of Schrödinger's quantum theory. 3- To derive the Schrodinger equation B-4 To apply the Schrodinger equation to some systems C- Teaching and learning methods 1 Lectures 2- Illustration means, such as: the smart board, the regular board, and whiteboard pens. 3- Use the calculator D_ Evaluation methods 1-Monthly exams 2- Annual exams E - Emotional and valuable goals 1- Adopting the method of dialogue between the student and the professor 2- Preparing organized reports 3- Adopting the method of discussion F- Transferable general and qualification skills (other skills related to employability And personal development. 1-The student's ability to work within the educational and professional work team 2- Positive thinking and utilizing the knowledge he has received 3-The ability to deal with parties outside the university and train with them 4 - That the student be able to learn and master the teaching profession.
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10 Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	Some basic concepts and foundations of classical mechanics	Classical Mechanics Review, Newton's Equations of Motion	The lecture	Weekly and monthly exams
2	2 Theoretical	Some basic concepts and foundations of classical mechanics	lacranch's Equations of Motion	The lecture	Weekly and monthly exams

3	2 Theoretical	Some basic concepts and foundations of classical mechanics	Solving the Kinematic Problem of a Harmonic Oscillator According to Classical Mechanics, Atomic Spectra	The lecture	Weekly and monthly exams
4	2 Theoretical	Some basic concepts and foundations of classical mechanics	Solving the Kinematic Problem of a Harmonic Oscillator According to Classical Mechanics Hamilton's Equations of Motion,	The lecture	Weekly and monthly exams
5	2 Theoretical	Reasons for the emergence of quantum mechanics	Failures of Classical Physics Blackbody Radiation, Photoelectric Effect	The lecture	Weekly and monthly exams
6	2 Theoretical	Reasons for the emergence of quantum mechanics	Failures of Classical Physics Spectral Lines of Atoms	The lecture	Weekly and monthly exams
7	2 Theoretical	Reasons for the emergence of quantum mechanics	Rutherford's Atomic Shape Model, De Broglie's Hypothesis, Heisenberg's Uncertainty Principle	The lecture	Weekly and monthly exams
8	2 Theoretical	Modern quantum theory	Assumptions of Quantum Mechanics 1st Postulate: Wave Function 2nd Postulate: Operators	The lecture	Weekly and monthly exams
9	2 Theoretical	Modern quantum theory	3rd Postulate: Eigenfunction and Value Subjectivity 4th Hypothesis: Average Value or Expected Value	The lecture	Weekly and monthly exams
10	2 Theoretical	Schrödinger equation	Derivation of the Schrödinger Equation	The lecture	Weekly and monthly exams
11	2 Theoretical	Applications of the Schrödinger equation	Particle in a Box	The lecture	Weekly and monthly exams
12	2 Theoretical	Applications of the Schrödinger equation	Harmonic Oscillator	The lecture	Weekly and monthly exams
13	2 Theoretical	Applications of the Schrödinger equation	Two-Particle Rigid Rotor	The lecture	Weekly and monthly exams

14	2 Theoretical	Applications of the Schrödinger equation	The Hydrogen Atom in Quantum Chemistry	The lecture	Weekly and monthly exams
15	2 Theoretical	Semester exam	Semester Exam		
16	2 Theoretical	Introduction to Spectroscopy	The Concept of Spectrum and Spectroscopy, Atomic and Molecular Spectra	The lecture	Weekly and monthly exams
17	2 Theoretical	Introduction to Spectroscopy	Spectral Regions, Width and Intensity of Spectral Transitions	The lecture	Weekly and monthly exams
18	2 Theoretical	Microwave Spectroscopy	Quantitative Description of the Rotation of Linear Molecules	The lecture	Weekly and monthly exams
19	2 Theoretical	Microwave Spectroscopy	Solid Rotor, Isotopic Substitution Effect, Coupling Phenomenon, Applications of Microwave Spectra	The lecture	Weekly and monthly exams
20	2 Theoretical	Infrared Spectra	Vibrations and Absorption Spectra of Two-Atom Molecules	The lecture	Weekly and monthly exams
21	2 Theoretical	Infrared Spectra	Harmonic and Anharmonic Oscillators and Their Energy Levels	The lecture	Weekly and monthly exams
22	2 Theoretical	Infrared Spectra	Vibrational and Rotational Spectra of Diatomic Molecules, Applications of Infrared Instruments	The lecture	Weekly and monthly exams
23	2 Theoretical	Raman Spectroscopy	Origin of Raman Spectroscopy, Raman Spectroscopy For linear molecules	The lecture	Weekly and monthly exams
24	2 Theoretical	Raman Spectroscopy	Raman vibrational spectra, applications of Raman spectrometers	The lecture	Weekly and monthly exams
25	2 Theoretical	Electron Spectra	Electron spectroscopy principle	The lecture	Weekly and monthly exams
26	2 Theoretical	Electron Spectra	Frank and Condon's principle, some applications of electron spectra	The lecture	Weekly and monthly exams
27	2 Theoretical	Nuclear Magnetic Resonance	Magnetic properties of nuclei, resonance spectroscopy, multiplicity of molecules in	The lecture	Weekly and monthly exams

		Spectroscopy	energy levels		
28	2 Theoretical	Nuclear Magnetic Resonance Spectroscopy	Chemical displacement, pairing and factors affecting it, applications of magnetic resonance spectroscopy	The lecture	Weekly and monthly exams
29	Term exam	Semester exam	Semester exam		
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)		- Quantum and Spectra by Dr. Qais Abdul Karim / University of Basra - Spectrum Book by Dr. Laila Muhammad Najib / University of Mosul			
Main references (sources)		Principles of Quantum Chemistry Dr. Mohamed Magdy Wasil / Al-Azhar University			
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1. Course Name:	
Elective	
2. Course Code:	
Chem.4.6.	
3. Semester / Year:	
Annual	
4. Description Preparation Date:	
23-12-2025	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours per week / 4units	
7. Course administrator's name (mention all, if more than one name)	
Name: Tamara Mustafa Nadhir Email: tamara.ma.n@uosamarra.edu.iq	
8. Course Objectives	
Course Objec Understand preservatives and their importance in preventing food spoilage, using proper dosages and measurements as recommended by the	

Food and Drug Authority.					
• Relate preservatives to daily life and how to avoid their excessive use. • Understand heavy metals, their significance in trace amounts, and the importance of avoiding exposure or consumption at high concentrations.					
9. Teaching and Learning Strategies					
Strategy		Use of whiteboard, smartboard, and blended learning tools.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2 Theoretical	Introduction to preservatives	General principles	Interactive lecture and discussion	Weekly quizzes
Second	2 Theoretical	Classification of preservatives	General principles	Interactive lecture and discussion	Weekly quizzes
Third	2 Theoretical	Colorants	General principles	Lecture + Laboratory	Weekly quizzes
Fourth	2 Theoretical	Their classification and importance	Colorants	Interactive lecture and discussion	Weekly quizzes
Fifth	2 Theoretical	Antioxidants - Definition and importance		Interactive lecture and discussion	Weekly quizzes
Sixth	2 Theoretical	Classification, types, and importance	Antioxidants	Interactive lecture and discussion	Weekly quizzes
Seventh	2 Theoretical	Heavy metals	General principles	Interactive lecture and discussion	Weekly quizzes
Eighth	2 Theoretical	Importance, classification, and types	General principles	Interactive lecture and discussion	Weekly quizzes
Ninth	2 Theoretical	Risks of heavy metals and protection methods	General principles	Interactive lecture and discussion	Weekly quizzes
tenth	2 Theoretical	Cadmium	General principles	Interactive lecture and discussion	Weekly quizzes
Eleventh	2 Theoretical	Acute and chronic toxicity, health impacts	Cadmium	Interactive lecture and discussion	Weekly quizzes
Twelfth	2 Theoretical	Lead	General principles	Interactive lecture and discussion	Weekly quizzes
Thirteenth	2 Theoretical	Acute and chronic toxicity, health impacts	Lead	Interactive lecture and discussion	Weekly quizzes
Fourteenth	2 Theoretical	Mercury	General	Interactive	Weekly quizzes

			principles	lecture and discussion	
Fifteenth	2 Theoretical	Toxicity, effects, presence, concentration, and prevention	Mercury	Lecture	Weekly quizzes
Sixteenth	2 Theoretical	Acidic additives	General principles	Lecture	Weekly quiz
Seventeenth	2 Theoretical	Classification and types	General principles	Interactive lecture and discussion	Weekly quizzes
Eighteenth	2 Theoretical	Importance, concentrations, and purpose	Acidic additives	Interactive lecture and discussion	Weekly quizzes
Nineteenth	2 Theoretical	Legally approved substances	General principles	Interactive lecture and discussion	Weekly quizzes
Twenty	2 Theoretical	Unapproved substances	General principles	Interactive lecture and discussion	Weekly quizzes

11. Course Evaluation

- **Midterms: 45**
- **Weekly quizzes: 5**
- **Final exam: 50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	• “Preservatives and Additives in Food Industries” book • “Water Pollutants Encyclopedia” • *Organic Chemistry* by Dr. Mohammad Nazar Ibrahim – College of Education – University of Mosul
Recommended books and references (scientific journals, reports...)	• VOGEL's Textbook of Practical Organic Chemistry* • *Organic Chemistry* by Paula Yurkanis Bruice • Iraqi Academic Journal: https://www.iasj.net
Electronic References, Websites	• https://2u.pw/3oWYspkg • https://t.me/organicbook