

**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

2024

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

Academic Program Description Form



University Name: Samarra

Faculty/Institute: Education

Scientific Department: chemistry

Academic or Professional Program Name: Bachelor of education in
chemistry

Final Certificate Name: Bachelor of education in chemistry

Academic System: annual

Description Preparation Date: 31/3/2024

File Completion Date: 7/4/2024

Signature:

Head of Department Name:

Dr. Liana Hussein
Alwan

Date: 7-4-2024

Signature:

Scientific Associate Name:

Yasir M. Saleh

Date:

7-4-2024

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:



on behalf.

Approval of the Dean

1. Program Vision

The department should be able to keep pace with the latest scientific and practical techniques in the field of chemistry. The department also seeks to achieve excellence in the field of 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 to provide scientific programs rich in information and skills, and to graduate students who have the ability to work in various fields and who also have the ability to 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 / 2024-2023	Chem.1.1	Organic Chemistry	2	2
First / 2024-2023	Chem.1.2.	Inorganic Chemistry	2	0
First / 2024-2023	Chem.1.3.	Analytical Chemistry	3	2
First / 2024-2023	Chem.1.4.	Biology	1	2
First / 2024-2023	Chem.1.5.	Mathematics	1	0
First / 2024-2023	Chem.1.6.	Fundamentals of Education	2	0
First / 2024-2023	Chem.1.7.	Educational	2	0

		psychology		
First / 2024-2023	Chem.1.8.	Chemical safety and security	1	0
First / 2024-2023	Chem.1.9.	Computer	1	0
First / 2024-2023	Chem.1.10.	Arabic Language	2	0
First / 2024-2023	Chem.1.11.	English Language	1	0
First / 2024-2023	Chem.1.12.	Democracy and Human Rights	1	0
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Second / 2024-2023	Chem.2.1.	Organic Chemistry	2	2
Second / 2024-2023	Chem.2.2.	Inorganic Chemistry	2	2
Second / 2024-2023	Chem.2.3	Analytical Chemistry	3	2
Second / 2024-2023	Chem.2.4.	Physical Chemistry	3	2
Second / 2024-2023	Chem.2.5.	Mathematics	1	0
Second / 2024-2023	Chem.2.6.	Education Administration and Secondary Education	2	0
Second / 2024-2023	Chem.2.7.	Developmental Psychology	2	0
Second / 2024-2023	Chem.2.8.	Computers	1	0
Second / 2024-2023	Chem.2.9.	English Language	1	0
Second / 2024-2023	Chem.2.10.	Crimes the Defunct Baath Party	1	
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Third / 2024-2023	Chem.3.1.	Organic Chemistry	2	2
Third / 2024-2023	Chem.3.2.	Coordination Chemistry	2	2
Third / 2024-2023	Chem.3.3.	Industrial Chemistry	2	0
Third / 2024-2023	Chem.3.4.	Physical Chemistry	3	2
Third / 2024-2023	Chem.3.5.	Biochemistry	2	2
Third / 2024-2023	Chem.3.6.	Elective	2	0

Third / 2024-2023	Chem.3.7.	Educational Counseling and Psychological Health	2	0
Third / 2024-2023	Chem.3.8.	Fundamentals of Scientific Research	2	0
Third / 2024-2023	Chem.3.9.	Curriculum and Teaching Methods	2	0
Third / 2024-2023	Chem.3.10.	English Language	1	0
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Forth / 2024-2023	Chem.4.1.	Organic Identification	2	3
Forth / 2024-2023	Chem.4.2.	Biochemistry	2	0
Forth / 2024-2023	Chem.4.3.	Instrumental Analysis	3	2
Forth / 2024-2023	Chem.4.4.	Industrial Chemistry	2	2
Forth / 2024-2023	Chem.4.5.	Spectral and Quantum Chemistry	2	0
Forth / 2024-2023	Chem.4.6.	Elective	2	0
Forth / 2024-2023	Chem.4.7.	Research Project	2	0
Forth / 2024-2023	Chem.4.8.	Measurement and Evaluation	2	0
Forth / 2024-2023	Chem.4.9.	Practical Education	1	2
Forth / 2024-2023	Chem.4.10.	English Language	1	0

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 in 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	<ul style="list-style-type: none"> - The student acquires dialogue and discussion skills. - That the student can reach different cognitive conclusions.
Learning Outcomes 3	<ul style="list-style-type: none"> - 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 successfully completing his studies in the program through his ability to teach a lesson in a classroom, for example.earning Outcomes Statement 4

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 in order 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			1	
	Chemistry	Inorganic			0	
	Chemistry	Biochemistry			1	
	Chemistry	Analysis			1	
Assistant Professor	Chemistry	Physical			0	
	Chemistry	organic			2	
	Chemistry	Inorganic			0	
	Chemistry	Biochemistry			1	
	Chemistry	Analysis			2	
	mathematics				1	
Teacher	Chemistry	Physical			0	
	Chemistry	organic			1	
	Chemistry	Inorganic			2	
	Chemistry	Biochemistry			1	
	Chemistry	Analysis			1	
	Chemistry	Industrial			2	
	Chemical engineering	Chemical engineering			1	
Assistance teacher	Chemistry	Physical			9	
	Chemistry	organic			6	

	Chemistry	Inorganic			2	
	Chemistry	Biochemistry			3	
	Chemistry	Analysis			5	
	Chemistry	Industrial			0	
	Chemical engineering	Chemical engineering			1	
	Agriculture	animal production			1	
	Biology	Physiology			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

14. Program Development Plan

Developing curricula by adopting the latest methodological regulations.

Program Skills Outline

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 2023/2024	Chem.1.1	Organic Chemistry	Basic												
	Chem.1.2.	Inorganic Chemistry	Basic												
	Chem.1.3.	Analytical Chemistry	Basic												
	Chem.1.4.	Biology	Basic												
	Chem.1.5.	Mathematics	Basic												
	Chem.1.6.	Fundamentals of Education	Basic												
	Chem.1.7.	Educational psychology	Basic												
	Chem.1.8.	Chemical safety and security	Basic												
	Chem.1.9.	Computer	Basic												
	Chem.1.10.	Arabic Language	Basic												
	Chem.1.11.	English Language	Basic												
	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 2023/2024	Chem.2.1.	Organic Chemistry	Basic												
	Chem.2.2.	Inorganic Chemistry	Basic												
	Chem.2.3	Analytical Chemistry	Basic												
	Chem.2.4.	Physical Chemistry	Basic												
	Chem.2.5.	Mathematics	Basic												
	Chem.2.6.	Education Administration and Secondary Education	Basic												
	Chem.2.7.	Developmental Psychology	Basic												
	Chem.2.8.	Computers	Basic												
	Chem.2.9.	English Language	Basic												
	Chem.2.10.	Crimes the Defunct Baath Party	Basic												

Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes												
				Knowledge				Skills				Ethics				
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	
third 2023/2024	Chem.3.1.	Organic Chemistry	Basic													
	Chem.3.2.	Coordination Chemistry	Basic													
	Chem.3.3	Industrial Chemistry	Basic													
	Chem.3.4.	Physical Chemistry	Basic													
	Chem.3.5.	Biochemistry	Basic													
	Chem.3.6.	Elective	Basic													
	Chem.3.7.	Educational Counseling and Psychological Health	Basic													
	Chem.3.8.	Fundamentals of Scientific Research	Basic													
	Chem.3.9.	Curriculum and Teaching Methods	Basic													
	Chem.3.10.	English Language	Basic													

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Forth 2023/2024	Chem.4.1.	Organic Identification	Basic												
	Chem.4.2.	Biochemistry	Basic												
	Chem.4.3	Instrumental Analysis	Basic												
	Chem.4.4.	Industrial Chemistry	Basic												
	Chem.4.5.	Spectral and Quantum Chemistry	Basic												
	Chem.4.6.	Elective	Basic												
	Chem.4.7.	Research Project	Basic												
	Chem.4.8.	Measurement and Evaluation	Basic												
	Chem.4.9.	Practical Education	Basic												
	Chem.4.10.	English Language	Basic												

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

Course Description Form

1. Course Name:					
Organic chemistry					
2. Course Code:					
Chem.1.1					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
28-3-2024					
5. Available Attendance Forms:					
Weakly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
88/6					
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					
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 + 2 experimental	Elements, compounds, compounds, atoms, molecules, configuration and periodic table	General principles	Lecture as Reactive discussion + lab	Weakly and course exams
second	2 theoretical + 2 experimental	Covalent bonding, formation of molecules, hybridization,	General principles	Lecture as Reactive	Weakly and

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

				+ lab	exams
Eighteenth	1 theoretical + 2 experimental	identifications of alkynes	alkynes	Lecture as Reactive discussion + lab	Weakly and course exams
Nineteenth	2 theoretical + 2 experimental	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 + 2 experimental	Nomenclature, reactions Orientation, mechanism of electrophilic substitution	Aromatic hydrocarbons	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-first	2 theoretical + 2 experimental	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 + 2 experimental	Nomenclature physical properties, resources, preparation	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-third	2 theoretical + 2 experimental	Reactions, Nucleophilic substitution	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-fourth	2 theoretical + 2 experimental	Reactions, elimination, identification of alkyl halides	Alkyl halides	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-fifth	2 theoretical + 2 experimental	Nomenclature, Classification, physical properties, resources, monohydroxyl alcohol	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-sixth	2 theoretical + 2 experimental	Preparation, synthesis by Grignard reagent	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-seventh	2 theoretical + 2 experimental	identification of alcohol	Alcohols	Lecture as Reactive discussion + lab	Weakly and course exams
Twenty-eighth	2 theoretical + 2 experimental	Nomenclature, physical properties, preparation, Reactions	Ethers	Lecture as Reactive discussion + lab	Weakly and course exams
twenty-ninth	2 theoretical + 2 experimental	epoxides	Ethers	Lecture as Reactive discussion + lab	Weakly and course exams
thirtieth	2 theoretical + 2 experimental	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

13.	Course Name:	Organic chemistry/first stage
14.	Course Code:	Chem.1.1.P.
15.	Semester /:	Year
16.	Description Preparation Date:	29-3-2024
17.	Available Attendance Forms:	weekly
18.	Number of Credit Hours (Total)	60 / Number of Units (Total) 6
19.	Course administrator's name (mention all, if more than one name)	
	Name: Jasim Ahmed Hassan Email: Jasim.iraq36@gmail.com Name: Mohammed Dahim Humedi Email: mohamed.d.h@uosamarra.edu.iq	
20.	Course Objectives	
	Course Objectives	1-Learn the names of tools and glassware inside the organic chemistry laboratory and how to use them 2-Learn important things inside the laboratory, including how to use devices and tools, as well as writing reports 3- Learn the types of substances and methods of separating them in the organic chemistry laboratory 4- Study some organic compounds in terms of their preparation methods, interactions, properties, and detection
21.	Teaching and Learning Strategies	
	Strategy	1. Adopting educational discussion, which depends on exchanging ideas to reach an understanding of the lecture. 2. The most important means available are the blackboard, colored pencils, and illustration media such as: the smart board. 3. Electronic lectures with video 4. Some classroom activities 5. Practical experiments

Course Structure .22

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding laboratory tools and how to write reports	Study the properties and use of some commonly used laboratory tools and write reports	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
2	2	The student should be aware of what crystallization processes are	Crystallization	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
3	2	How to purify solids	Purification of organic matter containing impurities	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
4	2	The student should be aware of the melting points of different materials	Melting point	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
5	2	The student can measure and determine the melting point of any unknown substance	Determine the melting point of an unknown compound	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
6	2	The student understands what the boiling point of liquids is	boiling temperature	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
7	2	How to determine and know the boiling point of an unknown	Determine the boiling point of an unknown compound	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
8	2	examination	examination		
9	2	Understanding simple distillation	distillation	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
10	2	How to separate different liquids at boiling points	Separating liquids of different boiling points	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
11	2	The concept of the	Use of violet dye:	Explanation by	Quarterly and

		nature of green color and how to determine it	separation of liquids Immiscible	projector + lab. experiment + showing a video	daily tests and weekly reports
12	2	How to extract an organic compound from a mixture using solvents	Extraction of an organic compound from a mixture using an organic solvent	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
13	2	Know how to extract an acid and a base	Acid-base extraction:	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
14	2	How to separate organic compounds	Separating compounds by chemical methods	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
15	2	examination	examination		
16	2	What is methane gas, where is it found, and how to prepare it	Preparation of methane gas	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
17	2	Methods of detecting gas and studying its properties	Study of the properties of methane gas	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
18	2	What is ethylene gas, where is it found, and how to prepare it	Ethylene gas	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
19	2	Methods of detecting gas and studying its properties	Study of the properties of ethylene gas	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
20	2	What is acetylene gas, where is it found, and how to prepare it	Acetylene gas	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
21	2	Methods of detecting gas and studying its properties		Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
22	2	examination	examination		
23	2	How to prepare aspirin	Preparing aspirin	Explanation by projector + lab. experiment +	Quarterly and daily tests and weekly reports

				showing a video	
24	2	Methods of detecting aspirin	Detection of aspirin	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
25	2	Methods used in detecting organic compounds	Detection of organic compounds (sodium detection)	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
26	2	What is fractional distillation and what are its uses	Fractional distillation	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
27	2	What is steam distillation and what are its uses?	Steam distillation	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
28	2	How to purify kerosene	Kerosene purification	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
29	2	Understand what are the methods to study the properties of kerosene	Study of the properties of kerosene	Explanation by projector + lab. experiment + showing a video	Quarterly and daily tests and weekly reports
30	2	examination	examination		

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A book of experiments in organic chemistry (written by Hasiba Abdel Sattar)
Main references (sources)	1. Fundamentals of Organic Chemistry Book - Practical, General Organization for Technical and Vocational Training, Kingdom of Saudi Arabia, 2008 2. VOGEL-Practical Organic Chemistry
Recommended books and references (scientific journals, reports...)	Molecules The Journal of Organic Chemistry
Electronic References, Websites	www.byto.com/vb/index.php

Course Description Form

1. Course name					
Inorganic chemistry					
2. Course code.					
chem.1.2					
3. Semester/Year					
Year					
4. The date this description was prepared					
29/3/2024					
5. regular attendance forms/Available					
6. (Number of study hours (total) / number of units (total					
60 hours / 4 units					
7. Name of the course administrator (if more than one name is (mentioned					
Name: Miami Hussein Email Miami.hu.ali.@uosamarra.edu.ia					
8. Course objectives					
<ul style="list-style-type: none"> • • • 		<p>Objectives of the study subject</p> <p>1- Teaching students, Department of Chemistry, first stage, the basics of .inorganic chemistry</p> <p>2- have occurred Scientific developments that in this field in order to enable them to teach</p> <p>This subject is for intermediate and preparatory studies</p>			
9. Teaching and learning strategies					
<p>The method of lectures as well as the method of -1 .thinking and discussion</p> <p>.Teaching through exploratory lecture -2</p> <p>3- learning (electronic tests, -Workshops and e (explanatory videos</p>			<p>The strategy</p>		
10. Course structure					
Evaluation method	Learning method	Name of the unit or topic	Required learning outcomes	hours	the week
Weekly and monthly exams	theory	How is the atomic structure of an electron ?	Atomic construction	2	1

Weekly and monthly exams	theory	The nature of the beam and types of beam	Electromagnetic beam	2	2
Weekly and monthly exams	theory	What are wave properties made of? What is the photoelectric effect?	Wave characteristics And the photoelectric effect	2	3
Weekly and monthly exams	theory	What did the scientist ?Rutherford find	Rutherford's theory	2	4
Weekly and monthly exams	theory	What are Bohr's hypotheses for the structure of ? the atom	Bohr's theory	2	5
Weekly and monthly exams	theory	What is this rule about?	Heisenberg rule In inaccuracy	2	6
Weekly and monthly exams	theory	What did Bohr's developed theory achieve?	Developed Bohr's theory	2	7
Weekly and monthly exams	theory	What is the equation he created? Throwdenker world and what it describes This equation	Throdenger equation	2	8
Weekly and monthly exams	theory	Numbers that specify a location Electron	Quantum numbers	2	9
Weekly and monthly	theory	Exam	Exam	2	10

exams					
Weekly and monthly exams	theory	Examples of arrangement Electronic	Electronic arrangement	2	11
Weekly and monthly exams	theory	Sectors of the periodic table	Periodic Table Talk to the elements	2	12
Weekly and monthly exams	theory	Classification of items based on On the saturation of its outer shell	Classification of elements Periodic Table	2	13
Weekly and monthly exams	theory	Find the term symbol for an atom of elements	Term symbol	2	14
Weekly and monthly exams	theory	Find the effective nuclear charge And examples of it	Blocking and properties Periodicity	2	15
Weekly and monthly exams	theory	Includes radii And Landy's method	Periodic properties	2	16
Weekly and monthly exams	theory	Adjectives include familiarity Negative electronic electrical	Complementary properties Periodicity	2	17
Weekly and monthly exams	theory	What is an ionic compound? Conditions for compound formation	Ionic compounds	2	18

		Ionic			
Weekly and monthly exams	theory	Polarization relationship to degree Fusion	Attracting vehicles Ionic	2	19
Weekly and monthly exams	theory	Consistency setting And geometric shapes	Consistency setting	2	20
Weekly and monthly exams	theory	Exam	Exam	2	21
Weekly and monthly exams	theory	Consistency number book And geometric shapes	Book examples Consistency number	2	22
Weekly and monthly exams	theory	Conditions for bond formation Covalent	Covalent compounds	2	23
Weekly and monthly exams	theory	Study of bond theory Parity	Composition theories Covalent bonds	2	24
Weekly and monthly exams	theory	Study of molecular orbitals	Orbital theory Partial	2	25
Weekly and monthly exams	theory	Confess And Orbital Molecular antidote		2	26
Weekly and monthly exams	theory	Exam	Exam	2	27
Weekly and monthly	theory	Division of orbitals	Types of symmetry	2	28

exams		Partiality in terms of its symmetry to the orbital Sakma	Orbitals		
11. Course evaluation					
Distributing the grade from 100 according to the tasks assigned to the student, such as the first semester exam, 25, the second semester 25 becomes 50, and the final is 50, which is added together and becomes 100.					
12. Resources for learning and teaching					
T D. Basim			(course books (methodology, if any		
Dr.. Muhammad Abdul Rahman Johar			(Main references (sources		
nothing			Recommended supporting books and) referencesscientific(...journals, reports		
Internet sites			references , Internet sites		

Course Description Form

1. Course Name:	
Analytical Chemistry	
2. Course Code:	
Chem .1.3.	
3. Semester /:	
Yearly	
4. Description Preparation Date:	
30/3/2024	
5. Available Attendance Forms:	
In-person inside the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
180 hours (theory and practical) / 9 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	<ol style="list-style-type: none">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.
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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	Semester and final exams (practical and theoretical)
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	Solubility and Solubility Product	Face-to-face lecture	

		Properties			
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

Course Name:					
Analytical Chemistry lab.					
Course Code:					
Chem .1.3.P					
Semester / Year:					
Quarterly and annually for the year 2023/2024					
Description Preparation Date:					
30/3/2024					
Available Attendance Forms:					
Weekly					
Number of Credit Hours (Total) / Number of Units (Total)					
56 h /2 unite					
Course administrator's name (mention all, if more than one name)					
Name:			Email:		
M.sc. Mahmood Shakir Mahmood			mahmood.shakir@uosamarra.edu.iq		
M.sc. Teeba Abdulsalam Abod			teeba.abdulsalam@uosamarra.edu.iq		
Course Objectives					
Course Objectives			<ul style="list-style-type: none"> • Understanding the basic principles of analytical chemistry. • Developing students' skills in material analysis. • Empowering students to apply their skills in solving real-world problems. 		
Teaching and Learning Strategies					
Strategy		Lectures. Laboratory experiment.			
Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
13.	2	Learn about the basics of analytical chemistry	Concepts and basic for analytical chemistry	lecture	Daily tests, periodic exams, and lab reports.
14.	2	Training students on safety procedures and precautions inside the laboratory	Chemical lab. Safety	lecture	Daily tests, periodic exams, and lab reports.
15.	2	Training on laboratory tools, knowing their names and how to use them	Chemical apparatuses practice	Experiment	Daily tests, periodic exams, and lab reports.

16.	2	Lear about quantitative analysis methods and techniques	Qualitative chemistry	lecture	Daily tests, periodic exams, and lab reports.
17.	2	Identification of analysis group elements using several reagents	Identification analysis group I (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
18.	2	Detect and diagnose unknown combinations of analysis group elements	Identification unknown of analysis group I (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
19.	2	Identification of analysis group elements using several reagents	Identification analysis group II (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
20.	2	Detect and diagnose unknown combinations of analysis group elements	Identification unknown of analysis group II (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
21.	2	Identification of analysis group elements using several reagents	Identification analysis group III (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
22.	2	Detect and diagnose unknown combinations of analysis group elements	Identification unknown of analysis group III (Cations)	Experiment	Daily tests, periodic exams, and lab reports.
23.	2	Identification of analysis group elements using several reagents	Identification analysis group I (Anions)	Experiment	Daily tests, periodic exams, and lab reports.
24.	2	Identification of analysis group elements using several reagents	Identification analysis group II (Anions)	Experiment	Daily tests, periodic exams, and lab reports.
25.	2	Identification of analysis group elements using several reagents	Identification analysis group III (Anions)	Experiment	Daily tests, periodic exams, and lab reports.
26.	2		Exam	First Semester	Daily tests, periodic exams, and lab reports.
27.	2	Study methods and techniques of quantitative analysis	Quantitative chemistry	lecture	Daily tests, periodic exams, and lab reports.
28.	2	Study of volumetric analysis and its most important methods	Volumetric analysis	lecture	Daily tests, periodic exams, and lab reports.
29.	2	Study the mathematical laws used to calculate chemical concentrations	Chemistry concentration expression methods	lecture	Daily tests, periodic exams, and lab reports.
30.	2	Training on preparing concentrations of a specific amount of samples	Preparation a solid and liquid solution in Molarity and Normality.	Experiment	Daily tests, periodic exams, and lab reports.
31.	2	Studying the mechanism of titration, its methods, benefits and uses	Titrations	lecture	Daily tests, periodic exams, and lab reports.
32.	2	Identify chemical indicators, their range, colors, and uses	Chemical indicators	lecture	Daily tests, periodic exams, and lab reports.
33.	2	Study of acid-base neutralization tests	Neutralization titrations	lecture	Daily tests, periodic exams, and lab reports.
34.	2	Titration of an unknown concentration	Standardization HCl by primary	Experiment	Daily tests, periodic exams, and lab reports.

		of HCl as a secondary standard solution	standard		
35.	2	Practical application on neutralization treatments using a strong acid, HCl, with a strong base, NaOH	Strong acid strong base titration	Experiment	Daily tests, periodic exams, and lab reports.
36.	2	Study of the technique of Precipitation titrations	Precipitation titrations	lecture	Daily tests, periodic exams, and lab reports.
37.	2	Determination of the chloride ion Cl by Moore's method using a solution of silver nitrate	Mohr's method	Experiment	Daily tests, periodic exams, and lab reports.
38.	2	Study of the technique of oxidation-reduction titrations	Redox titrations	lecture	Daily tests, periodic exams, and lab reports.
39.	2	Using potassium permanganate as an oxidizing agent to quantify samples	Titration with oxidation agent KMnO ₄	Experiment	Daily tests, periodic exams, and lab reports.
40.	2	Technical study of complex formation corrections	Complexometric titrations	lecture	Daily tests, periodic exams, and lab reports.
41.	2	Measuring the hardness of water and estimating the percentage of salts that cause this hardness	Hard water test	Experiment	Daily tests, periodic exams, and lab reports.
42.	2		Exam	Second Semester	Daily tests, periodic exams, and lab reports.
43.	2		Exam	Final	Daily tests, periodic exams, and lab reports.

44. 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 2

Experiments reports for first semester 3

Monthly exam for the second semester 20

Daily exam for the second semester 2

Experiments reports for second semester 3

Annual quest 15

final exam 50

45. 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)	<ul style="list-style-type: none"> • Principle of analytical chemistry (Al-Ghafagi)
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> • Vogel's"Qualitative Inorganic Analysis" Seventh Edition, Revised by G. Svehla, Longman Group Limited, England 1996.
Electronic References, Websites	<ul style="list-style-type: none"> • International Union of Pure and Applied Chemistry https://www.iupac.org/divisions/II/ • Royal Society of Chemistry https://www.rsc.org

Course Description Form

1. Course Name:					
General biology					
2. Course Code:					
Chem.1.4.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
2024/3/30					
5. Available Attendance Forms:					
Attendance (theoretical + practical)					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hour/ 4 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Afrah Abdullah jasim					
Email: afrah.abdullah89@gmail.com					
8. Course Objectives					
Course Objectives			<p>1-Providing students with effective cognitive and professional skills in the field of biology.</p> <p>2- Preparing students for different professional paths, such as scientific research.</p> <p>3- Stimulating social responsibility among students within an ethical and professional framework.</p> <p>4- Getting students to know the types of living organisms.</p> <p>5- Understanding the environment, its importance, and how to preserve it</p>		
9. Teaching and Learning Strategies					
Strategy		<p>1-Daily exams</p> <p>2-reports</p> <p>3-semester exams</p> <p>4-attendance</p> <p>5-extracurricular activities</p>			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to biology	introducing the student to biology, a	Lecture with dialogue and	Daily and semester

			historical overview, and the stages of development	discussion and the use of the blackboard	exams
2	2	Students acquire knowledge of the branches of biology	The importance of biology and the characteristics of life	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
3	2	Identify the characteristics of living organisms	the main method of building matter	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
4	2	The student knows the importance of carbohydrates, fats.	the main materials building the cell	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
5	2	The student knows the importance of proteins, and nucleic acids	the main materials building the cell	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
6	2	Learn about the classification of living organisms, the importance of classification, and knowledge of classification systems	Taxonomy	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
7	2	Identify methods of reproduction in prokaryotic and plants	Reproduction and growth in (bacteria) Reproduction and growth in plants	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
8	2	methods of reproduction and growth in animals	reproduction and growth in animals	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
9	2	the importance of hormones and glands in animals and plants	Hormonal coordination	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams
10	2	Learn about the environment, the components of the ecosystem, and the relationship	Ecology	Lecture with dialogue and discussion and the use of the blackboard	Daily and semester exams

		between living organisms			
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)			Biology Al-Saadi, H, A; Dawoud, H,; Al-Khazraji, T, A; Korkis, N,S. (2005).Biology. Pen office.		
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1. Course Name:	
General Biology	
2. Course Code:	
Chem.1.4.P.	
3. Semester / Year:	
Yearly	
4. Description Preparation Date:	
3/3/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4/ 42	
7. Course administrator's name (mention all, if more than one name)	
Name: Hamza Riyadh Abdullhameed Email: hammza20112001@gmail.com Name: Sura Samir Abdullhameed Name: Alaa Abdulkareem Majeed	
8. Course Objectives	
Course Objectives	
9. Teaching and Learning Strategies	
Strategy	<p>A- Cognitive objectives</p> <p>A1- Enabling the student to become familiar with laboratory tools and equipment and the precautions that must be taken inside the laboratory.</p> <p>A2- Enabling the student to know the structure and function of the cell, living and non-living organelles, and cell division.</p> <p>A3- Identify the main organic compounds in living organisms.</p> <p>A4- Identifying and classifying animal tissues.</p> <p>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.</p> <p>B - The skills objectives of the course</p> <p>B1 - Developing students' skills in using the optical microscope.</p> <p>B2 - Developing students' skills in identifying the types and stages of cell division.</p> <p>B3 - Developing students' skills in identifying and diagnosing animal tissues under the microscope.</p> <p>B4- Developing students' skills in the process of drawing blood and conducting tests.</p> <p>B5- Developing students' skills in recall, analysis and discussion.</p>

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	www scientific websites

Course Description Form

1. Course Name :					
Chemical safety and security					
2. Course Code :					
Chem.1.8.					
3. Semester / Year : 2023-2024					
4. Description Preparation Date :					
30/3/2024					
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 : assistant teacher. Suha Abdullah Hussein					
Email : suha.al.hdaad@gmail.com					
8. Course Objectives					
Course Objectives		<ul style="list-style-type: none"> 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 visits chemical laboratories and conducting some exercises related to chemical safety ; 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	Introduction to the course	Lecture and discussion	Examinations

		and safety office			
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 the 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	Chemical safety	Lecture and	Examinations

		applying laboratory safety rules		discussion + Laboratory	
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	General Procedures for	Working using	Lecture	Examinations

	Lecture	dealing with hazardous chemicals materials	chemicals	and discussion	
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 discussion + Laboratory	Examinations
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	Emergency training	Emergency plans	Lecture	Examinations

	exercise			and discussion + Laborator y	
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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)	Security and safety of the chemical laboratory Guide to prudent chemical management Lisa Moran and Tina Masciangioli
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Main references (sources)	
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Recommended books and references (scientific journals, reports...)	
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Electronic References, Websites	
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Course Description Form

1. Course Name:					
English Language/ first stage					
2. Course Code:					
Chem.1.11.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
31/3/2024					
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: mohammed mahmood					
Email: mohammed.m@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives			<p>The aim of this course is to help students to achieve an English language through:</p> <ul style="list-style-type: none"> • Enable students to define & use target vocabulary and grammar forms in meaningful writing and speaking contexts. • Enable students to identify and analyze key information related to a reading or listening topic. 		
9. Teaching and Learning Strategies					
Strategy		<p>Communicative language teaching (CLT)</p> <p>This approach is probably now the most popular teaching model for English language teaching globally through focus on fluency of communication rather than accuracy and lessons are more hands-on than theoretical.</p> <p>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.</p>			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	One hour	Unit 1 Hello!	Introductions • Numbers 1-10! • <i>am/are/is</i> • Plurals • What's this in English? • Good morning!	dialogic teaching: involves ongoing talk between teacher and students	daily exam
2	One hour	Unit 1 Hello!	Solve unit 1 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
3	One hour	Unit 2 Your world	Countries • <i>am/are/is</i> • <i>Her name's ... /She's from ...</i> • Questions • Adjectives <i>good/awful...</i> • Numbers 11-30	dialogic teaching: involves ongoing talk between teacher and students	daily exam
4	One hour		Solve unit 2 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
5	One hour	Unit 3 All about you	Jobs • <i>am / are / is</i> • Vocabulary revision • Questions and negatives • Social expressions (1)	dialogic teaching: involves ongoing talk between teacher and students	daily exam
6	One hour		Solve unit 3 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
7	One hour	Unit 4 Family and friends	The family Possessive 's • <i>has/ have</i> • <i>my / our / her.</i> • Vocabulary revision • The alphabet	dialogic teaching: involves ongoing talk between teacher and students	daily exam
8	One hour		Solve unit 4 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
9	One hour	semester exam			semester exam
10	One hour	Unit 5 The way I live	Sports/food/drink • Present Simple - <i>I/you/they</i> • Languages and nationalities • <i>How much is it?</i>	dialogic teaching: involves ongoing talk between teacher and students	daily exam

11	One hour	Solve unit 5 exercises		dialogic teaching: involves ongoing talk between teacher and students	daily exam
12	One hour	Unit 6 Every day	The time • Present Simple - <i>he/she</i> • Prepositions <i>in/ at/ on</i> • Words that go together • Days of the week	dialogic teaching: involves ongoing talk between teacher and students	daily exam
13	One hour	Solve unit 6 exercises		dialogic teaching: involves ongoing talk between teacher and students	daily exam
14	One hour	Unit 7 My favourites	Questions • Pronouns <i>me / him</i> • Possessive adjectives <i>my/his</i> • <i>this / that</i> • Adjectives <i>happy / miserable</i> • <i>Can I. . . ?</i>	dialogic teaching: involves ongoing talk between teacher and students	daily exam
15	One hour	Solve unit 7 exercises		dialogic teaching: involves ongoing talk between teacher and students	daily exam
16	One hour	Unit 8 Where I live	Rooms and furniture • <i>There is/there are</i> • Prepositions <i>on/under/next to . . .</i> • Vocabulary revision • Directions	dialogic teaching: involves ongoing talk between teacher and students	daily exam
17	One hour	Unit 8 Where I live	Solve unit 8 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
18	One hour	Semester two examination	Semester two examination		
19	One hour	Unit 9 Time past	Saying years Was/were Past simple Irregular verb Have /do/go Months and dates	dialogic teaching: involves ongoing talk between teacher and students	Semester exam
20	One hour	Unit 9 Time past	Solve unit 9 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam

21	One hour	Unit 10 We had a great time!	Past Simple - regular verbs • Questions and negatives • Making conversation • Sport and leisure activities • Going sightseeing	dialogic teaching: involves ongoing talk between teacher and students	daily exam
22	One hour	Unit 10 We had a great time!	Solve unit 9 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
23	One hour	Unit 11 I can do that!	<i>Con/ can't</i> • Adverbs - <i>very well! not at all . . .</i> • Requests and offers • Adjective + noun • Everyday problems	dialogic teaching: involves ongoing talk between teacher and students	daily exam
24	One hour	Unit 11 I can do that!	Solve unit 11 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam
25	One hour	Semester two examination	Semester two examination		Semester exam
26	One hour	Unit 12 Please and thank you	I'd like –some/any In restaurant Signs all around	dialogic teaching: involves ongoing talk between teacher and students	daily exam
27	One hour	Unit 12 Please and thank	Solve unit 11 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 beginner: Student's Book . Liz and John Soars –New Headway beginner: workbook . Liz and John Soars
Main references (sources)	–New Headway beginner: test Book . Liz and John Soars
Recommended books and references (scientific journals, reports...)	

Electronic References, Websites

<https://elt.oup.com/student/headway/beg/download?cc=global&selLanguage=en>

Course Description Form

1. Course Name:					
Organic chemistry					
2. Course Code:					
Chem.2.1.					
3. Semester / Year:					
Year					
4. Description Preparation					
Date:2024-3-28					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
114/6					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Muath Jabbar Tarfa Email: maath52@uosamarra.edu.iq Name: Mustafa Abdel Qader Fadel Email: mostafa.abd@uosamarra.edu.iq					
8. Course Objectives					
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
1	2	alcohols	Nomenclature, Classification,	Lecture as effective	Weakly and course

			physical properties, resources,	discussion + lab	exams
2	2	alcohols	Mono hydroxy alcohol, poly hydroxy alcohol	Lecture as effective discussion + lab	Weakly and course exams
3	2	alcohols	Preparation of mono hydroxy alcohol, reactions	Lecture as effective discussion + lab	Weakly and course exams
4	2	Ethers and epoxides	Nomenclature, physical properties, preparation	Lecture as effective discussion + lab	Weakly and course exams
5	2	Ethers and epoxides	Reactions of ethers, preparation of epoxides	Lecture as effective discussion + lab	Weakly and course exams
6	2	Ethers and epoxides	Reactions of epoxides	Lecture as effective discussion + lab	Weakly and course exams
7	2	Aldehydes and ketones	Structure, physical properties, aldehyde and ketone compounds	Lecture as effective discussion + lab	Weakly and course exams
8	2	Aldehydes and ketones	Preparations, Reactions	Lecture as effective discussion + lab	Weakly and course exams
9	2	Aldehydes and ketones	Nucleophilic addition for double bond in carbonyl compounds, classification of carbonyl compounds	Lecture as effective discussion + lab	Weakly and course exams

10	2	Aldehydes and ketones	Acidity of alpha-hydrogen atom, condensation reactions with their mechanisms	Lecture as effective discussion + lab	Weakly and course exams
11	2	Carboxylic acids	Structure, physical properties, Nomenclature, Salts of carboxylic acids	Lecture as effective discussion + lab	Weakly and course exams
12	2	Carboxylic acids	Resources, Preparation of carboxylic acids	Lecture as effective discussion + lab	Weakly and course exams
13	2	Carboxylic acids	Reactions of carboxylic acids, dicarboxylic acids	Lecture as effective discussion + lab	Weakly and course exams
14	2	Carboxylic acid derivatives	Structure, physical properties, Nomenclature	Lecture as effective discussion	Weakly and course exams
15	2	Carboxylic acid derivatives	Types of carboxylic acid derivatives, preparation of carboxylic acid derivatives	Lecture as effective discussion	Weakly and course exams
16	2	Carboxylic acid derivatives	Reactions of carboxylic acid derivatives	Lecture as effective discussion	Weakly and course exams
17	2	Carboxylic acid derivatives	Completion of carboxylic acid derivatives reactions	Lecture as effective discussion	Weakly and course exams
18	2	Amines and diazonium salts	Structure, Classification, Nomenclature,	Lecture as effective discussion	Weakly and course exams

			physical properties, amines salts, resources		
19	2	Amines and diazonium salts	Preparation of amine compounds, basicity of amines, reactions of amines (substitution)	Lecture as effective discussion	Weakly and course exams
20	2	Amines and diazonium salts	Reactions of nitrous acid, formation of diazonium salts, coupling reactions by diazonium salts	Lecture as effective discussion	Weakly and course exams
21	2	phenols	General formulation and structure, physical properties, resources	Lecture as effective discussion	Weakly and course exams
22	2	phenols	Preparation, reactions	Lecture as effective discussion	Weakly and course exams
23	2	Aryl halides	General formulation and structure, physical properties	Lecture as effective discussion	Weakly and course exams
24	2	Aryl halides	Preparation	Lecture as effective discussion	Weakly and course exams
25	2	Aryl halides	Reactions	Lecture as effective discussion	Weakly and course exams
26	2	Organo sulfur compounds	structure, physical properties, Preparation	Lecture as effective discussion	Weakly and course exams
27	2	Organo sulfur compounds	Reactions of Organo sulfur compounds	Lecture as effective discussion	Weakly and course exams

28	2	Organo sulfur compounds	Sulfonic properties	Lecture as effective discussion	Weakly and course exams
29	2	Organo phosphorus compounds	Types of Organo phosphorus compounds	Lecture as effective discussion	Weakly and course exams
30	2	Organo phosphorus compounds	Preparation of Organo phosphorus compounds	Lecture as effective discussion	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 ORGANIC CHEMISTRY By Graham Solomons
Main references (sources)	الكيمياء العضوية تأليف الدكتور محمد نزار إبراهيم - قسم الكيمياء - كلية التربية - جامعة الموصل ميكانيكية التفاعلات العضوية تأليف الدكتور خالد محمود داؤود - قسم الكيمياء - كلية التربية - جامعة الموصل
Recommended books and references (scientific journals, reports...)	VOGEL S Textbook of PRACTICAL ORGANIC CHEMISTRY Organic Chemistry by Paula Yurkanis Bruice المجلة الأكاديمية العراقية: https://www.iasj.ne
Electronic References, Websites	https://2u.pw/3oWYspkg https://t.me/organicbook

Course Description Form

25.	Course Name:				
	Inorganic chemistry - second stage				
26.	Course Code:				
	Chem.2.2.				
27.	Semester / Year:				
	Year				
28.	Description Preparation Date:				
	2024/4/6				
29.	Available Attendance Forms:				
	weekly				
30.6.	Number of Credit Hours (Total) / Number of Units (Total)				
	52 hours / 6 units				
31.	Course administrator's name (mention all, if more than one name)				
	Name: Mawlood Khald Mawlood Email: mawlod.khld@uosamarra.edu.iq				
32.	Course Objectives				
Course Objectives	<ul style="list-style-type: none"> • Learn about the periodic table • Methods of preparing elements • Study general properties and interactions 				
33.	Teaching and Learning Strategies				
Strategy	<p>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</p>				
10.	Course Structure				
Evaluation method	Teaching method	How the elements are distributed in the periodic table	Required learning outcomes	Hours	The week
Weekly and monthly exams And laboratory reports	The lecture	Hydrogen (introduction, preparation) binoculars and photographs	Elements of the periodic table	2	1
Weekly and monthly exams And laboratory reports	The lecture	Hydrogen bonds, their types, and acids	Elements of the periodic table	2	2

Weekly and monthly exams And laboratory reports	The lecture	hybridization	Hydrogen	2	3
Weekly and monthly exams And laboratory reports	The lecture	Exam	hydrogen bond	2	4
Weekly and monthly exams And laboratory reports	The lecture	The elements of the first group, their presence and distribution, and their properties	hybridization	2	5
Exam		Preparation and vehicles of the first group	Exam	2	6
Weekly and monthly exams And laboratory reports	The lecture	The elements of the second group, their existence and properties	First group elements	2	7
Weekly and monthly exams And laboratory reports	The lecture	Some elements of the second group, their preparation	First group elements	2	8
Weekly and monthly exams And laboratory reports	The lecture	The elements of the third group, their presence and methods of preparation	Elements of the second group	2	9
Weekly and monthly exams And laboratory reports	The lecture	Boron, its compounds, and its importance	Elements of the second group	2	10
Weekly and monthly exams And laboratory reports	The lecture	Aluminum, its compounds and their importance	Elements of the third group	2	11
Weekly and monthly exams And laboratory reports	The lecture		Elements of the third group	2	12
Weekly and monthly exams And laboratory reports	The lecture	Group IV elements, carbon, its isotopes, and their reactions	Elements of the third group	2	13
Weekly and monthly exams	The lecture		Exam	2	14

And laboratory reports					
Weekly and monthly exams And laboratory reports	The lecture	Silicon and its compounds and their importance with the rest of the elements	Elements of the fourth group	2	15
		Introduction to the elements of the fifth group	half year holiday		16
Weekly and monthly exams And laboratory reports	The lecture	Nitrogen, its importance, its compounds, and methods of preparing it	Silicon	2	17
Weekly and monthly exams And laboratory reports	The lecture	Phosphorus, its compounds, and methods of preparation	Elements of the fifth group	2	18
Weekly and monthly exams And laboratory reports	The lecture	Group 6 elements: Oxygen and its diffusion	Elements of the fifth group	2	19
Weekly and monthly exams And laboratory reports	The lecture	Oxygen compounds, their importance and methods of preparation	Elements of the fifth group	2	20
Weekly and monthly exams And laboratory reports	The lecture	Sulfur, its compounds, and methods of preparation	Elements of the sixth group	2	21
Weekly and monthly exams And laboratory reports	The lecture	The rest of the members of the sixth group	Elements of the sixth group	2	22
	The lecture	The seventh group (Halogens)	Elements of the sixth group	2	23
Weekly and monthly exams And laboratory reports	The lecture	Exam	Elements of the sixth group	2	24
Weekly and monthly exams And laboratory reports	The lecture		Elements of the seventh group	2	25
			Exam	2	26

34. 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

35. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Dr. Mahdi Naji Zakum - Chemistry of Representative Basra, Iraq. 1988 - Dr. Elements - University Publications 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:					
Inorganic chemistry practical / second stage					
2. Course Code:					
Chem.2.2.P.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
30/3/2024					
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: huda mutar ibrahem					
Email: Huda.mutar@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives			Studying the periodic table sums of the major elements while performing experiments for some elements for each A group of The seven groups of the periodic table.		
9. Teaching and Learning Strategies					
Strategy		The method of lectures is the method of thinking and discussion Education by Exploratory Urbanism Illustration means such as: smart board and videos E-learning and electronic tests Workshops Conduct experiments			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2Practical	Experiment report	Introduction to	practical	Weekly and monthly exam

			how to write an experiment report		
2	2Practical	Elements of the periodic table	A study on the division of the elements of the periodic table	practical	Weekly and monthly exam
3	2Practical	Distinguishing between acids, bases, and salts	Acids, bases, and salts	practical	Weekly and monthly exam
4	2Practical	Hydrogen (introduction and properties)	Preparation of hydrogen by the action of dilute acid on a metal	practical	Weekly and monthly exam
5	2Practical	The first group	Preparation of lithium chloride	practical	Weekly and monthly exam
6	2Practical	(Alkali)	Preparation of sodium chloride	practical	Weekly and monthly exam
7	2Practical	Sodium chloride	Food salt purification	practical	Weekly and monthly exam
8	2Practical	Purification of table salt		practical	Weekly and monthly exam
9	2Practical	Alkaline earth metals	(NaCl)	practical	Weekly and monthly exam
10	2Practical	Exam	Exam	practical	Weekly and monthly exam
11	2Practical	Barium chromate	Preparation of	practical	Weekly and monthly exam

			barium chromate BaCrO ₄		
12	2Practical	The third group	Introduction to the boron group and general reactions	practical	Weekly and monthly exam
13	2Practical	Boron oxide	Preparation Boron oxide	practical	Weekly and monthly exam
14	2Practical	Barium borate	Preparation Barium borate	practical	Weekly and monthly exam
15	2Practical	Detection of chromium ion ions	Preparation of boron oxide B ₂ O ₃	practical	Weekly and monthly exam
16	2Practical	Central exam	Preparation of barium borate Ba(BO ₂) ₂	practical	Weekly and monthly exam
17	2Practical	Aluminum oxide	Detection of chromium alum ions	practical	Weekly and monthly exam
18	2Practical	Fourth group	Preparation of lead chrome PbCrO ₄	practical	Weekly and monthly exam
19	2Practical	Lead chromate	Preparation of calcium carbonate CaCO ₃	practical	Weekly and monthly exam
20	2Practical	Preparation of calcium carbonate	Reactions of calcium,	practical	Weekly and monthly exam

			strontium, and barium ions (Ca^{+2} , Ba^{+2}), Sr^{+2}		
21	2Practical	Exam	Exam	Exam	Weekly and monthly exam
22	2Practical	Fifth group	Introduction to nitrogen	practical	Weekly and monthly exam
23	2Practical	Acid barium phosphate	Preparation of acidic barium phosphate	practical	Weekly and monthly exam
24	2Practical	Nitrogen group reactions	BaHPO_4	practical	Weekly and monthly exam
25	2Practical	Reactions of the boron group	Study of some nitrogen group reactions	practical	Weekly and monthly exam
26	2Practical	Know the properties of compounds	General interactions	practical	Weekly and monthly exam
27	2Practical	Exam	Exam	Exam	Weekly and monthly exam
28	2Practical	Sixth group	Introduction to oxygen	practical	Weekly and monthly exam
29	2Practical	Oxygen group	Preparing it and studying some of its properties	practical	Weekly and monthly exam
30	2Practical	Exam	Exam	Exam	Weekly and monthly 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

The first semester exam score is 5

Report 1

Attendance 1.5

The second chapter has the same layout

Final exam of 15

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Practical organic chemistry book for the second stage – Written by Dr. In the name of Al-Saadi 2- Practical inorganic chemistry book - written by Dr. Ali Ajam
Main references (sources)	A.F.Vogel, Qualitative Chemical Analysis, 1981.
Recommended books and references (scientific journals, reports...)	/
Electronic References, Websites	1-Textbook;, Concepts & Models of Inorganic Chemistry, edition, Wiley, New, 2009. 2-Svehla / Sivasankar, Vogel's Qualitative - Inorganic Analysis, 2012

Course Description Form

1. Course Name:	
Analytical Chemistry Second stage	
2. Course Code:	
Chem.2.3	
3. Semester / Year:	
Annual for the Academic Year 2023/2024	
4. Description Preparation Date:	
March 31 st , 2024	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours / 6 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Madyan Adnan Yaseen Email: Madyan.yaseen@my.jcu.edu.au	
8. Course Objectives	
<p>This course consists of two sections:</p> <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. <p>This course is also important in the study of some subsequent courses such as theoretical analysis (3)..</p>
9. Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none"> 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 methods of homogeneous solutions, causes of precipitate contamination and types of Precipitates.	Some theoretical foundations of the sedimentation process	Brainstorming Tasks, Dialogue, and discussion	Assignment (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	Crystalline composition of sediments	Interactive Lecture Dialogue and Discussion	Short exam Semester exam

		homogeneous solutions - sediment contamination and its types Avoid sediment contamination and treatment methods Precipitate digestion process - Precipitate washing - Re-sedimentation process -			
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 <ul style="list-style-type: none"> •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 Test T - Test F - Test Q Mathematical problems in the treatment of statistical results.	Statistical treatments of the results of the analysis	Interactive Lecture Dialogue and Discussion	Assignment (problem solving) and exams

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)	<ul style="list-style-type: none">• 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 العباجي و د. ثابت سعيد الغبشة• الكيمياء التحليلية الجزء الأول الأسس العامة للتحليل الكمي الوزني تأليف د. صفاء المرعب• 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...)	<ul style="list-style-type: none">• Harris, Daniel C. <i>Quantitative Chemical Analysis</i>. 7th ed. W. H. Freeman, 2007
Electronic References, Websites	<p>Home - Chemistry LibreTexts https://www.rsc.org/ https://www.chemistryworld.com/</p>

Course Description Form

1. Course Name:					
Practical analytical chemistry/ second stage					
2. Course Code:					
Chem.2.3.P.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
30/3/2024					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 practical hours + 3 theoretical hours / 6 units					
7. Course administrator's name (mention all, if more than one name)					
Name: assistant teacher Baidaa Adnan Jassim Email: baidaa9227@gmail.com Name: assistant teacher Suha Abdullah Hussein Email: suha.al.hdaad@gmail.com					
8. Course Objectives					
Course Objectives			<ul style="list-style-type: none"> • 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	Laboratory	Examinations

			Water hydration In $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$		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
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 solution	Determination of Aluminum as Aluminum oxide	Laboratory	Examinations Monthly and Weekly and reports
11	2 hours	Quantitative Gravimetric Analysis	Determination of Nickel as dimethyl Glyoxime 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		
14		Half year holiday	Half year holiday		
15	2 hours	Examination	Examination	Laboratory	Examinations Monthly
16	2 hours	Separation methods	Introduction of Separation methods	Laboratory	Examinations Monthly and Weekly and reports
17	2 hours	Separation	Separation iron	Laboratory	Examinations

		By precipitation (direct)	To Aluminum by precipitation		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
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 Paper Chromatography	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:					
Theoretical Physical Chemistry / Second Stage					
2. Course Code:					
Chem.2.4.					
3. Semester / Year:					
Quarterly and annually for the year 2023/2024					
4. Description Preparation Date:					
28/3/2024					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total)					
Number of Units (Total): 60 virtual hours					
7. Course administrator's name (mention all, if more than one name)					
Name: Hassan Faisal Muhammad					
Email: hassan.fis.mu@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives	Developing students' scientific and cognitive skills in the following fields: 1-Introducing the student to the transformations of energy into its different forms through the laws of energy. Modidynamic (first and second law). 2- Knowledge of thermal chemistry and its laws. 3-Knowing chemical equilibrium and its laws				
9. Teaching and Learning Strategies					
Strategy	Enable the student to obtain theoretical knowledge of the laws of physical chemistry The student's knowledge of the basic concepts of the laws of thermodynamics. The student's knowledge of the laws of thermochemistry The student's knowledge of chemical equilibrium and its laws				
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	General properties of gases	Gases	2	1

Weekly and monthly exams And laboratory reports	The lecture	Gas laws	Gases	2	2
Weekly and monthly exams And laboratory reports	The lecture	Kinetic molecular theory of gases	Gases	2	3
Weekly and monthly exams And laboratory reports	The lecture	Thermodynamics – general introduction	Thermodynamics	2	4
Weekly and monthly exams And laboratory reports	The lecture	First law of thermodynamics	Thermodynamics	2	5
Weekly and monthly exams And laboratory reports	The lecture	Processes at constant temperature	Thermodynamics	2	6
Weekly and	The	adiabatic processes	Thermodynamics	2	7

monthly exams And laboratory reports	lecture				
Weekly and monthly exams And laboratory reports	The lecture	The relationship between T V,	Thermodynamics	2	8
Weekly and monthly exams And laboratory reports	The lecture	The relationship between (T,P) and V,P	Thermodynamics	2	9
Weekly and monthly exams And laboratory reports	The lecture	Thermochemistry	Thermochemistry	2	10
Weekly and monthly exams And laboratory reports	The lecture	Laws of thermochemistry	Thermochemistry	2	11
Weekly and monthly	The lecture	The second law of thermodynamics	Thermodynamics	2	12

exams And laboratory reports					
Weekly and monthly exams And laboratory reports	The lecture	Carnot thermal cycle	Thermochemistry	2	13
Weekly and monthly exams And laboratory reports	The lecture	Automatic processes	Thermodynamics	2	14
Weekly and monthly exams And laboratory reports	The lecture	First semester exam	Exam	2	15
		Half-year vacation			16
Weekly and monthly exams And laboratory reports	The lecture	Entropy	Entropy	2	17
Weekly and monthly	The	Various alien laws	Entropy	2	18

exams And laboratory reports	lecture				
Weekly and monthly exams And laboratory reports	The lecture	The third law of thermodynamics	Thermodynamics	2	19
Weekly and monthly exams And laboratory reports	The lecture	Free energy and chemical potential	Free energy	2	20
Weekly and monthly exams And laboratory reports	The lecture	The two types of free energy	Free energy	2	21
Weekly and monthly exams And laboratory reports	The lecture	The basic equations of closed systems	Closed systems	2	22
	The lecture	Second semester exam	Exam	2	

Weekly and monthly exams And laboratory reports	The lecture	Maxwell's relations	Maxwell's relations	2	23
Weekly and monthly exams And laboratory reports	The lecture	Chemical equilibrium – Equilibrium	Chemical equilibrium	2	24

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)	- Physical Chemistry/Dr. Laila Muhammad Naguib - Thermodynamics and its applications in chemistry/Dr. Jalal Muhammad Saleh
Main references (sources)	
Recommended books and references (scientific journals, reports...)	-P.W. Atkins physical chemistry, 7th edition, 2007. -Essential of (physical chemistry) by ArunBahlB.S.Bahl 2000.
Electronic References, Websites	-Physical chemistry Third edition by Robert silbey and alberty, 2001 -Physical chemistry fourth edition by Laidler , Meiser and Sanctuary, 2003

Course Description Form

13. Course Name:					
English Language/second stage					
14. Course Code:					
Chem.2.9.					
15. Semester / Year:					
Year					
16. Description Preparation Date:					
31/3/2024					
17. Available Attendance Forms:					
weekly					
18. Number of Credit Hours (Total) / Number of Units (Total)					
30 hours/2 Number of Units					
19. Course administrator's name (mention all, if more than one name)					
Name: mohammed mahmood					
Email: mohammed.m@uosamarra.edu.iq					
20. Course Objectives					
Course Objectives		<p>The aim of this course is to help students to achieve an English language through:</p> <ul style="list-style-type: none"> • Enable students to define & use target vocabulary and grammar forms in meaningful writing and speaking contexts. • Enable students to identify and analyze key information related to a reading or listening topic. 			
21. Teaching and Learning Strategies					
Strategy		<p>Communicative language teaching (CLT)</p> <p>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.</p> <p>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.</p>			
22. 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 lot of</i> • Articles • Shopping • Prices	dialogic teaching: involves ongoing talk between teacher and students	daily exam
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	dialogic teaching: involves ongoing talk between teacher and students	daily exam

			Directions		
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 don'ts	Have(got)to Should/must Words that got together	dialogic teaching: involves ongoing talk between teacher and students	daily exam
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 and reality	Second conditional Might Phrasal verbs	dialogic teaching: involves ongoing talk between teacher and students	daily exam
27	One hour	Unit 12 Dreams and reality	Solve unit 12 exercises	dialogic teaching: involves ongoing talk between teacher and students	daily exam

23. Course Evaluation

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

24. 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

Course Description Form

1. Course Name:					
Organic Chemistry					
2. Course Code:					
Chem.3.1.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
2024/4/6					
5. Available Attendance Forms:					
Weekly					
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: Malath Khalaf Rasheed					
Email: dr.malath.rasheed@ousamarra.edu.iq					
8. Course Objectives					
Course Objectives			<ul style="list-style-type: none"> ● Introducing students to: ● Factors affecting the abundance of electrons in bonds and atoms ● Acids and bases ● Methods of preparing intermediate compounds, their stability and interactions ● Nucleophilic substitution reactions ● Elimination reactions ● Multicyclic Aromatic compounds 		
9. Teaching and Learning Strategies					
Strategy					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation 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,	Lecture with procedure Dialogue and	Quarterly and daily tests

			naming it, methods of preparing it	discussion	
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	Polycyclic aromatic compounds	Polycyclic aromatic compounds: naphthalene and its derivatives, their preparation and reactions	Lecture with procedure Dialogue and discussion	Quarterly and daily tests
30	2 Theoretical	Polycyclic 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/

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:	
30/3/2024	
5. Available Attendance Forms:	
daily	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/4 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	
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	<p>A- Cognitive objectives</p> <p>1- Enable the student to obtain theoretical knowledge of organic chemistry</p> <p>2- The student's knowledge of the structures of esters, amides, ketones, aldehydes, and liposome bases. carboxylic acids</p> <p>3- Introducing the student to the mechanics of reactions prepared from esters, imides and keto Nats, aldehydes, chaff bases, and carboxylic acids</p> <p>B - The skill objectives of the course</p> <p>1 - The student is proficient in preparing each of the esters, amides, ketones, aldehydes, and bases. Smells and acids Carboxylic.</p> <p>2-Distinguish between some compounds such as esters, carboxylic acids, and ketones. Ions and aldehydes.</p> <p>3-Distinguishing between intermediates of reactions and methods of preparing them.</p> <p>4-The student is proficient in writing the special structures of some organic compounds.</p> <p>1 Lectures 2- Demonstration means such as: the smart board 3- Use of the</p>

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	Estarat	3-Nitophthalic anhydride	Laboratory	Weekly exams and laboratory reports
2	2practica	Synthesis of Schiff Bases1	Synthesis of one of the imine compounds	Laboratory	Weekly exams and laboratory reports
3	2practica	Cannizzaro Reaction	Benzyl alcohol and sodium Benzoite	Laboratory	Weekly exams and laboratory reports
4	2practica	Synthesis of Azo dyes	3-phenyldiazenyl) 2-Naphthol	Laboratory	Weekly exams and laboratory reports
5	2practica	Synthesis of Schiff Bases1	Benzalderivative	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	Synthesis of amidate	Synthesis of Acetanilide	Laboratory	Weekly exams and laboratory reports
9	2practica	Synthesis of diazonium salt	Synthesis of diazonium chloride	Laboratory	Weekly exams and laboratory reports
10	2practica	Condensation reaction	Pinacol to Pinacolone Rearrangement	Laboratory	Weekly exams and laboratory reports
11	2practica	Isolation of natural products	Isolation of caffeine from tea	Laboratory	Weekly exams and laboratory reports
12	2practica		Monthly test		
13	2practica	Beckmann Rearrangement	N-Phenylbenzamide (Caprolactam)	Laboratory	Weekly exams and laboratory reports
14	2practica	Synthesis of Benzoin	Benzoin (α -Hydroxy Diphenylketone)	Laboratory	Weekly exams and laboratory reports
15	2practica	diketones	Oxidation of Benzoin to benzil	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), 5 th 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), 3 rd Ed. By Philippa B. Cranwell, Laurence M. Harwood, Christopher J. Moody, 2017.

Course Description Form

1. Course Name:	
Industrial chemistry	
2. Course Code:	
Chem.3.3.	
3. Semester / Year:	
Year	
4. Description Preparation Date:	
27-3-2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
52 hr/ 6 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Sarah Saad Mohammed Jawad	
Email: saadnadeen@uosamarra.edu.iq	
8. Course Objectives	
<p>Course Objectives</p> <ul style="list-style-type: none"> • Students' knowledge of the petroleum industries <p>Part of the national wealth and the most important industries</p> <p>Petrochemical</p> <ul style="list-style-type: none"> • Identify the most important problems that occur <p>In petrochemical industries such as corrosion</p> <p>Pollution, hard water, etc</p> <p>And how to treat it.</p>	<p>Course Objectives</p> <p>-Students' knowledge of the petroleum industries</p> <p>Part of the national wealth and the most important industries</p> <p>Petrochemical</p> <p>-Identify the most important problems that occur</p> <p>In petrochemical industries such as corrosion</p> <p>Pollution, hard water, etc</p> <p>And how to treat it.</p>
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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Petroleum	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	lecture	Weekly and Monthly exams

			crude oil		
3	2	Petroleum	Processing crude oil and preparing it for refining	lecture	Weekly and Monthly exams
4	2	Petroleum	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	lecture	Weekly and Monthly exams
7	2	Petroleum	The most important Petrochemical industries	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	Exam	Exam	lecture	Weekly and Monthly exams
11	2		Halogen compounds	lecture	Weekly and Monthly

			In petrochemical industries		exams
12	2		Halogen compounds In petrochemical industries	lecture	Weekly and Monthly exams
13	2		Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
14	2		Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
15	2		Oxidation processes in Petrochemical industries	lecture	Weekly and Monthly exams
16	2		Glass industry	lecture	Weekly and Monthly exams
17	2		Glass industry	lecture	Weekly and Monthly exams
18	2		Corrosion in chemical industries	lecture	Weekly and Monthly exams
19	2		Corrosion in chemical industries	lecture	Weekly and Monthly exams
20	2		Corrosion theories	lecture	Weekly and Monthly exams
21	2		Factors affecting	lecture	Weekly and

			corrosion And methods of eliminating corrosion		Monthly exams
22	2		Water and industry	lecture	Weekly and Monthly exams
23	2		Hardship water and types of hardness And ways to get rid of hardship	lecture	Weekly and Monthly exams
24	2	Exam	exam	lecture	Weekly and Monthly exams
25	2		Cement industry	lecture	Weekly and Monthly exams
26	2		Characteristics, types of pesticides and methods Getting rid of pests	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:					
Physical Chemistry					
2. Course Code:					
Chem.3.4					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
5/4/2024					
5. Available Attendance Forms:					
Regularity					
6. Number of Credit Hours (Total) / Number of Units (Total)					
120 hours / 7 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Noor Saddam abdulhadi Email: noor.saddam18@gmail.com					
8. Course Objectives					
<p>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.</p> <p>2. Explaining the basic concepts of kinetic and electrical chemistry, clarifying the theories and their development, laws and equations, and how to derive them.</p> <p>3. Developing students' skills in using the computer to process results and using it to draw</p>			<p>graphs to obtain precise and accurate results.</p> <p>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.</p> <p>Explaining the most important applications kinetic and electrical physical chemistry and their importance in the practical field.</p>		
9. Teaching and Learning Strategies					
Strategy		<p>1- Explanation and clarification.</p> <p>2- Lecture method.</p> <p>3- Discussion method.</p>			
10- The course structure					
Evaluation method	Teaching method	outcomes Name of unit/or subject	Required learning	hours	week

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 conductivity	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

1. Semester exam (theory 35 + practical 15) = 50%
2. 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-Aqrabi 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	
2. Course Code:	
Chem.3.4.p.	
3. Semester / Year:	
4. Quarterly/annually for the year 2023-2024	
5. Description Preparation Date:	
30-3-2024	
6. Available Attendance Forms:	
Weekly	
7. Number of Credit Hours (Total) / Number of Units (Total)	
7/52	
8. Course administrator's name (mention all, if more than one name)	
Name: Saba Thamer , Sama Ali, Reem Ibrahim Email: Saba.th.m@uosamarra.edu.iq Samaali919s@gmail.com reem.ibrahim@uosamarra.edu.iq	
9. Course Objectives	
	<p>Includes course objectives</p> <ul style="list-style-type: none"> - General objectives of the course <p>Developing students' scientific and cognitive skills in the following areas:</p> <ol style="list-style-type: none"> 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.
10. Teaching and Learning Strategies	
Strategy	<p>Course Objectives</p> <p>The student must master the mathematical operations to extract the orders of reaction, calculate the value of the constant, and graphs.</p> <p>B2 – The student is distinguished by learning to use each device in the laboratory</p>

B3 – The student is proficient in researching external sources such as the library and the Internet through: Offering external activities in each laboratory experiment.

11. 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
3	22	Finding the reaction rate constant	Decomposition of ethyl acetate by sodium hydroxide	Lecture with dialogue and discussion	Quarterly and daily tests
4	2	Finding the rate constant, velocity and half-life	Decomposition of diazanium benzene chloride	Lecture with dialogue and discussion	Quarterly and daily tests
5	2	Finding the rate	Reaction of	Lecture with	Quarterly and

		constant, velocity and half-life	acetone with iodine in the presence of acid as a catalyst	dialogue and discussion	daily tests
6	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
7	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
8	2	Finding the rate constant, velocity and half-life	Sulfite radical with iodate radical	Lecture with dialogue and discussion	Quarterly and daily tests
9	2	Determine the order of the reaction and the rate of reaction rate	Study of the autocatalytic reaction between potassium	Lecture with dialogue and discussion	Quarterly and daily tests

			permanganate and oxalic acid		
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	Lecture with dialogue and discussion	Quarterly and daily tests

			cells that consume electric current, such as plating and deposition cells		
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 equivalent conductivity when	Measure electrical conductivity	Lecture with dialogue and discussion	Quarterly and daily tests

		diluting to infinity	and determine the dissociation constant of the weak electrolyte		
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

12. 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

13. 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
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Course Description Form

10.	Course Name:
	Biochemistry

11. Course Code:.					
Chem.3.5.					
12. Semester / Year:					
Year					
13. Description Preparation Date:					
30/3/2024					
14. Available Attendance Forms:					
weekly					
15. Number of Credit Hours (Total) / Number of Units (Total)					
56 Hours / 6					
16. Course administrator's name (mention all, if more than one name)					
Name: nuha ali					
Email: noha 62@uosamarra.edu.iq					
17. Course Objectives					
Course Objectives			<ul style="list-style-type: none"> • Studying the types of carbohydrates. • Study of amino acids and proteins • Study the composition of fats and fatty acids 		
18. Teaching and Learning Strategies					
Strategy					
19. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	Biochemistry	Introduction to Biochemistry	Lecture	Weekly and monthly exams
2	2 Theoretical	Carbohydrates	Carbohydrates	Lecture	Weekly and monthly exams
3	2 Theoretical	Carbohydrates	carbohydrates	Lecture	Weekly and monthly exams
4	2 Theoretical	Carbohydrates	carbohydrates	Lecture	Weekly and monthly exams

5	2 Theoretical	Carbohydrates	carbohydrates	Lecture	Weekly and monthly exams
6	2 Theoretical	Carbohydrates	carbohydrates	Lecture	Weekly and monthly exams
7	2 Theoretical	Fats	Fats	Lecture	Weekly and monthly exams
8	2 Theoretical	Fats	Fats	Lecture	Weekly and monthly exams
9	2 Theoretical	Fats	Fats	Lecture	Weekly and monthly exams
10	2 Theoretical	Fats	Fats	Lecture	Weekly and monthly exams
11	2 Theoretical	Amino Acids	Amino Acids and Peptides	Lecture	Weekly and monthly exams
12	2 Theoretical	Amino Acids	Amino Acids and Peptides	Lecture	Weekly and monthly exams
13	2 Theoretical	Amino Acids	Amino Acids and Peptides	Lecture	Weekly and monthly exams
14	2 Theoretical	Amino Acids	Amino Acids and Peptides	Lecture	Weekly and monthly exams
15	2 Theoretical	Proteins	proteins	Lecture	Weekly and monthly exams
16	2 Theoretical	Proteins	proteins	Lecture	Weekly and monthly exams
17	2 Theoretical	Nucleic Acids	Nucleic Acids and Nucleotides	Lecture	Weekly and monthly exams
18	2 Theoretical	Nucleic Acids	Nucleic Acids and Nucleotides	Lecture	Weekly and monthly exams
19	2 Theoretical	Enzymes	Enzymes	Lecture	Weekly and monthly exams
20	2 Theoretical	Enzymes	Enzymes	Lecture	Weekly and monthly exams
21	2 Theoretical	Enzymes	Enzymes	Lecture	Weekly and monthly exams
22	2 Theoretical	Vitamins	vitamins	Lecture	Weekly and monthly exams
23	2 Theoretical	Vitamins	vitamins	Lecture	Weekly and monthly exams
24	2 Theoretical	Vitamins	vitamins	Lecture	Weekly and monthly exams
25	2 Theoretical	Hormones	Hormones	Lecture	Weekly and monthly exams
26	2 Theoretical	Hormones	Hormones	Lecture	Weekly and monthly exams
27	2 Theoretical	Hormones	Hormones	Lecture	Weekly and monthly exams
28	2 Theoretical	Hormones	Hormones	Lecture	Weekly and monthly exams

20. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc	
21. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Introduction to Biochemistry, Dr. Khawla Al-Flih
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Biochemistry, Part One, Dr. Tariq Younis, Dr. Louay Abdel Hilali Ministry of Higher Education and Scientific Research, University of Mosul
Electronic References, Websites	Harper's Biochemistry

Course Description Form

1 Course Name:
Research methodology

2 Course Code:	
Chem.3.8	
3 Semester / Year:	
Quarterly/annually for the year 2023–2024	
4 Description Preparation Date:	
3-4-2024	
5 Available Attendance Forms:	
weakly	
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: Rasha tahreer tariq Email: rashatt4990@gmail.com	
8 Course Objectives	
Course Objectives	<ul style="list-style-type: none"> • Identifying the meaning of science, its characteristics, knowledge, its types, methods of accessing it, and knowing the characteristics of scientific knowledge. • Identifying scientific research, its objectives, elements and characteristics, knowing the characteristics of a good scientific researcher, and shedding light on samples in scientific research and tools for collecting information. • Knowing the stages of preparing scientific research, how to search for sources and references, how to write them, and the method of discussing the research, as well as the formal and objective aspects.
9 Teaching and Learning Strategies	

Strategy	<p>-The student must master the distinction between science and knowledge and become familiar with scientific research and its characteristics</p> <p>-The student must master how to write scientific research and how to collect the samples he needs in the research.</p> <p>-The student must master how to search for sources and how to write them.</p>
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10 Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Concept of science	Learn about the concept of science and its characteristics	Lecture and discussion	Oral questions
2	2	Concept of knowledge	Identifying the concept of knowledge and its types, including sensory knowledge and philosophical knowledge	Lecture and discussion	Oral questions
3	2	Scientific knowledge	Identify the characteristics of scientific knowledge and distinguish between scientific knowledge and other knowledge	Lecture and discussion	Oral questions
4	2	Research	Identify scientific research, its objectives, elements and characteristics	Lecture and discussion	Oral questions

5	2	Types of scientific research	Identify its types according to the purpose and purpose and the methods used	Lecture and discussion	Oral questions
6	2	Characteristics of a scientific researcher	Identify the qualities and characteristics of the researcher and good scientific research	Lecture and discussion	Oral questions
7	2	Samples and information collection tools	Identify samples in scientific research, their types, and tools for collecting information from sources, documents, questionnaires, interviews, and observation	Lecture and discussion	Oral questions
8	2	Sources and documents	Identify its types from primary and secondary sources	Lecture and discussion	Oral questions
9	2	Second semester exam			Written questions
10	2	Ways to display information	Learn to present information structurally and in the form of tables and graphs	Lecture and discussion	Oral questions
11	2	statistical analysis	Identify its concept, importance, and factors affecting the choice of the	Lecture and discussion	Oral questions

			appropriate statistical analysis method		
12	2	Statistical analysis programs	Familiarity with statistical analysis programs such as SPSS, SAS, EVIEWE, and MINITAP	Lecture and discussion	Oral questions
13	2	How to write scientific research	Identify the linguistic and terminological definition of sources and references, their nature, how to use them, and their importance in scientific research	Lecture and discussion	Oral questions
14	2	Documentation and its importance	Identify the types of documentation and methods of documenting scientific research sources and references.	Lecture and discussion	Oral questions
15	2	Mechanism for quoting sources and references	Learn about ways to quote sources and references, such as transferring the entire text, abbreviating it, or paraphrasing it.	Lecture and discussion	Oral questions
16	2	Scientific research	Learn how to	Lecture and	Oral

		references from the Internet	obtain scientific research references from the Internet	discussion	questions
17	2	Arranging sources in scientific research	Identify the arrangement of sources, either by type, by alphabetical letters, by date of publication, or by appearance in the search.	Lecture and discussion	Oral questions
18	2	Controls for writing sources and references for scientific research	Recognizing the controls of writing, including organization, coordination, accuracy in writing footnotes, and not citing a source that was not used	Lecture and discussion	Oral questions
19	2	Stages of preparing scientific research	Identifying the stages of research preparation, from the preparatory stage, the stage of collecting scientific material, and the final stage	Lecture and discussion	Oral questions
20	2	Criteria and conditions for choosing a research topic	Identify the standards and conditions that the researcher must take into account	Lecture and discussion	Oral questions
21	2	Registration of	Learn about the	Lecture and	Oral

		scientific research	procedures for registering scientific research	discussion	questions
22	2	The research problem and its initial plan	Identify the initial and final research problem and the initial research plan	Lecture and discussion	Oral questions
23	2	Second semester exam			Written questions
24	2	Organizing the search process	Identify the specialty and field in which the research falls, the people who can be sought out, and the allotted time period	Lecture and discussion	Oral questions
25	2	The stage of collecting scientific material and preparing the research	Learn how to collect scientific material from books, periodicals, field research results, etc	Lecture and discussion	Oral questions
26	2	How to search for sources	Identify the criteria for the subject of the document, the author's name, date, novelty, and modernity	Lecture and discussion	Oral questions
27	2	The elements and types of good reading	Identify the good elements, as they must be broad and comprehensive, and the reader must be disciplined and persistent	Lecture and discussion	Oral questions

28	2	Documenting the research and preparing indexes	Recognizing the importance of documenting research and preparing lists of sources and references	Lecture and discussion	Oral questions
29	2	The stage of organizing the research	It includes printing the research, its number of copies, binding, arranging and numbering it	Lecture and discussion	Oral questions
30	2	Discussing scientific research	Recognizing that the discussion is both formal and substantive	Lecture and discussion	Oral questions

11 Course Evaluation

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

12 Learning and Teaching Resources

Required textbooks (curricular books, any)	-----
Main references (sources)	Al-Rahman Badawi (197 Scientific Research Metho Publications Agency, Fahd Salem Street (Kuwait)
Recommended books and references (scientific journals, reports...)	R. Bouhoush & Muhamm Mahmoud Al-Dhaniyat (200 Scientific research methods a methods of preparing resear Office of University Publication Algeria
Electronic References, Websites	-----

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:					
30/3/2024					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
150 hours					
7. Course administrator's name (mention all, if more than one name)					
Name: Assist. Professor Dr. Maha Salih Hussein Assist. Professor Dr. Diana Abd Alkreem Shakeer Email: Maha.s56@uosamarra.edu.iq deyana.abd@uosamarra.edu.iq					
8. Course Objectives					
Course Objectiv	Identifying the composition of organic compounds spectroscopically studying M.S., NMR, IR, and UV spectra and identifying unknown organic substances in laboratory by conducting laboratory tests.				
9. Teaching and Learning Strategies					
Strategy	The student's knowledge of organic identification methods and problem solving through theoretical lectures and laboratory scientific experiments, with the 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	Electromagnetic radiation and the ultraviolet spectrum UV	Lecture + laboratory	Weekly and monthly exams and laboratory reports
2.	2 theoretical + 3 practical	UV	Factors affecting location absorption bands	Lecture + laboratory	Weekly and monthly exams and laboratory reports
3.	2 theoretical	UV	Calculate	Lecture	Weekly and

	+ 3 practical		wavelength of dienes	+ laboratory	monthly exams and laboratory reports
4.	2 theoretical + 3 practical	UV	Calculating the wavelength of unsaturated carbonyl compounds	Lecture + laboratory	Weekly and 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.	Monthly exam 1 (first semester)				
8.	2 theoretical + 3 practical	Infrared I.R	General introduct of I. R	Lecture + laboratory	Weekly and monthly exams and laboratory reports
9.	2 theoretical + 3 practical	Infrared I.R	theory	Lecture + laboratory	Weekly and monthly exams and laboratory reports
10.	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
11.	2 theoretical + 3 practical	Infrared I.R	Analysis and interpretation of IR spectra	Lecture + laboratory	Weekly and monthly exams and laboratory reports
12.	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
13.	2 theoretical +	Infrared I.R	Aromatic compounds,	Lecture +	Weekly and monthly

	3 practical		alcohols and ethers, ketones and aldehydes,	laboratory	exams and laboratory reports
14.	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
15.	2 theoretical + 3 practical	Infrared I.R	Amines, amino acids and their salts, nitriles, nitro compounds, organic halogen compounds	Lecture + laboratory	Weekly and monthly exams and laboratory reports
16.	2 theoretical + 3 practical	Infrared I.R	Exercises and examples	Lecture + laboratory	Weekly and monthly exams and laboratory reports
17.	Monthly exam 2 (first semester)				
18.	2 theoretical +	NMR spectrum ^1H NMR	General introduction and theory	Lecture + laboratory	Weekly and monthly exams and laboratory reports
19.	2 theoretical + 3 practical	^1H NMR	Chemical shift	Lecture + laboratory	Weekly and monthly exams and laboratory reports
20.	2 theoretical + 3 practical	^1H NMR	Factors affecting chemical shift	Lecture + laboratory	Weekly and monthly exams and laboratory reports
21.	2 theoretical + 3 practical	^1H NMR	Splitting of resonance (spin-spin coupling)	Lecture + laboratory	Weekly and monthly exams and laboratory reports
22.	2 theoretical + 3 practical	^1H NMR	Analysis and interpretation of ^1H NMR	Lecture + laboratory	Weekly and monthly exams and laboratory reports
23.	2 theoretical + 3 practical	^1H NMR	Exercises and examples	Lecture + laboratory	Weekly and monthly exams and

					laboratory reports
24.	Monthly exam1 (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 + 3 practical	M.S	Molecular ion and fragmentation	Lecture + laboratory	Weekly and monthly exams and laboratory reports
27.	2 theoretical + 3 practical	M.S	Exercises and examples	Lecture + laboratory	Weekly and monthly exams and laboratory reports
28.	Monthly exam2 (second semester)				
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)			<p>1- R. Silverstein, F. Webster and D. Kiemle, "Spectrometric Identification of Organic Compounds", 7th Ed., John Wiley and Sons, Inc., New York (2005).</p> <p>2- Carey, Francis A., and Richard J. Sundberg. <i>Advanced organic chemistry: part A: structure and mechanisms</i>. Springer Science & Business Media, 2007.</p>		
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:					
Practical diagnosis of organic compounds/stage four					
2 Course Code:					
Chem.4.1.p.					
3 Semester / Year:					
Year					
4 Description Preparation Date:					
27/3/2024					
5 Available Attendance Forms:					
weekly					
6 Number of Credit Hours (Total) / Number of Units (Total)					
56 hours/7 Units					
7 Course administrator's name (mention all, if more than one name)					
Name: Mohammed Dahim Humedi Email: mohamed.d.h@uosamarra.edu.iq Name: Jassim Ahmed Hassan Email: jasim.iraq36@gmail.com					
8 Course Objectives					
Course Objectives		<ul style="list-style-type: none"> • Learn the steps to diagnose an unknown organic compound • 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		<ul style="list-style-type: none"> • Lectures • Demonstration means such as the smart board 			
10 Course Structure					
Wee	Hour	Required Learning	Unit or subject	Learnin	Evaluatio

k	s	Outcomes	name	g method	n method
1	2	Recognize what is organic diagnosis	Introduction to Organic Diagnosis	Lecture and Show video	Weekly and monthly
2	2	Steps to identify an aerator of an unknown organic compound	Identify an unknown organic compound by the systematic method	Lecture and Show video	Weekly and monthly
3	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
4	2	The importance of physical examination to know the unknown organic compound	Physical examination of the unknown	Lecture and Show video	Weekly and monthly
5	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
6	2	The importance of determining the solubility class to know the identity of the organic compound	Determination of solubility class for an unknown organic compound	Lecture and Show video	Weekly and monthly
7	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
8	2	Exam	First Semester Exam	Lecture and	Weekly and monthly

				Show video	
9	2	Detection of active aggregates of organic compound	Detection of functional aggregates	Lecture and Show video	Weekly and monthly
10	2	How to detect unsaturated organic compounds	Detection of double bond	Lecture and Show video	Weekly and monthly
11	2	Alcohol detection method	Alcohol detection	Lecture and Show video	Weekly and monthly
12	2	Method of detecting aldehydes and ketones	Detection of aldehydes and ketones	Lecture and Show video	Weekly and monthly
13	2	Method of detecting carboxylic acids	Detection of carboxylic acids	Lecture and Show video	Weekly and monthly
14	2	Method of detecting amine	Amine Detection	Lecture and Show video	Weekly and monthly
15	2	Method of detecting amides	Detection of amides	Lecture and Show video	Weekly and monthly
16	2	Method of detecting phenols	Phenols Detection	Lecture and Show video	Weekly and monthly
17	2	Method of detecting ester	Ester detection	Lecture	Weekly and

				and Show video	monthly
18	2	Method of detecting Nitro Group	Nitro Group Detection	Lecture and Show video	Weekly and monthly
19	2	Method of detecting Ethers	Ethers detection	Lecture and Show video	Weekly and monthly
20	2	Method of detecting Nitrilatal	Nitrilatal Detection	Lecture and Show video	Weekly and monthly
21	2	Examiner	Examiner Chapter Two	Lecture and Show video	Weekly and monthly
22	2	How to prepare a derivative of an unknown organic compound	Preparation of the derivative of the unknown organic compound,	Lecture and Show video	Weekly and monthly
23	2	Knowledge and diagnosis of the organic compound	Spectrophotometry of an organic compound	Lecture and Show video	Weekly and monthly
24-28	2	unknown			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, any)	Organic and natural diagnosis Abdul-Jabbar is loyal
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:					
3/4/2024					
5 Available Attendance Forms:					
week					
6 Number of Credit Hours (Total) / Number of Units (Total) 2/4					
48 Hours /4 Units					
7 Course administrator's name (mention all, if more than one name)					
Name: Prof Dr. Othman Rashid Al Samarrai Email: othmansamarrai@gmail.com					
8 Course Objectives					
					Course Objectives Study of the biological metabolism carbohydrates, lipids, and proteins, as well as 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 of carbohydrate 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				
Learning Strategies	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
1.	2	Life energy	Life energy	lecture	Weekly and monthly exams
2.	2	Life energy	Life energy	lecture	Weekly and monthly exams
3.	2	metabolism	Carbohydrate	lecture	Weekly and

			metabolism		monthly exams
4.	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
5.	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
6.	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
7.	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
8.	2	metabolism	Carbohydrate metabolism	lecture	Weekly and monthly exams
9.	2	exam	exam	lecture	Weekly and monthly exams
10.	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
11.	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
12.	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
13.	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
14.	2	metabolism	Lipids metabolism	lecture	Weekly and monthly exams
15.	2	exam	exam	lecture	Weekly and monthly exams
16.	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
17.	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
18.	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
19.	2	metabolism	Protein metabolism	lecture	Weekly and monthly exams
20.	2	exam	exam	lecture	Weekly and monthly exams
21.	2	Genetic information	Genetic information	lecture	Weekly and monthly exams
22.	2	Genetic information	Genetic information	lecture	Weekly and monthly exams
23.	2	exam	exam	lecture	Weekly and monthly exams
24.	2	test	test	lecture	Weekly and monthly exams

25.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

26.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
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					
4 Description Preparation Date:					
29/3/2024					
5 Available Attendance Forms:					
Lectures					
6 Number of Credit Hours (Total) / Number of Units (Total)					
64/9					
7 Course administrator's name (mention all, if more than one name)					
Name: Eman Thiab Ahmed Email: eman.dh@uosamarra.edu.iq					
8 Course Objectives					
Course Objectives			<ul style="list-style-type: none"> • The student learns about methods automated analysis using modern devices • The importance of automated methods • How to work on devices 		
9 Teaching and Learning Strategies					
Strategy					
10 Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Analytical Analysis	Analytical chemistry and the concept of instrumentl Chemical analysis	Lecture + laboratory	Weekly and monthly exams And laboratory reports

2	2	Electromagnetic radiation	Electromagnetic radiation and its effect with Substance	Lecture + laboratory	Weekly and monthly exams And laboratory reports
3	2	Electromagnetic radiation	Electromagnetic spectrum and refraction Radiation and scattering	Lecture + laboratory	Weekly and monthly exams And laboratory reports
4	2	Electromagnetic radiation	Polarization of light and optical efficiency	Lecture + laboratory	Weekly and monthly exams And laboratory reports
5	2	Absorption, fluorescence, and phosphorescence	Absorption of atomic and molecular radiation fluorescence and phosphorescence	Lecture + Laboratory	Weekly and monthly exams laboratory reports
6	2	Quantitative analysis	Quantitative analysis by radiation absorption And Lambert-Beer law	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
7	2	Quantitative analysis	Application of Lambert-Beer's law to systems multiple aspects and limitations in its application	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
8	2	Spectroscopic measurement	Spectrophotometer devices and their components and radiant energy sources	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
9	2	Spectroscopic measurement	Wavelength controllers and their types +Detectors and their types	Lecture + laboratory	Weekly and monthly exams And laboratory reports
10	2	Spectroscopic measurement	Examples of colorimetric and spectrophotometer devices	Lecture + Laboratory	Weekly and monthly exams And laboratory

					reports
11	2	Spectroscopic measurement	Applications of absorption measurements in Ultraviolet and visible spectroscopy	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
12	2	Spectroscopic measurement	Quantitative analysis and its applications	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
13	2	scattering and turbidity	Analysis by measuring scattering and turbidity	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
14	2	Infrared absorption spectroscopy	Analysis by infrared spectroscopy Red	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
15	2	Exam	Exam	Exam	Exam
16	2	School application	School application	School application	School application
17	2	School application	School application	School application	School application
18	2	School application	School application	School application	School application
19	2	School application	School application	School application	School application
20	2	School application	School application	School application	School application
21	2	School application	School application	School application	School application
22	2	Atomic spectroscopy (atomic	Analysis by electrochemical methods	Lecture + Laboratory	Weekly and monthly exams

		absorption)	And the Nernst equation		And laboratory reports
23	2	Atomic spectroscopy	Atomic spectroscopy + burners and foggers	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
24	2	Atomic spectroscopy (atomic emission)	Atomic emission	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
25	2	Exam	Exam	Lecture + Laboratory	Exam
26	2	Thermal analysis methods		Lecture + Laboratory	Weekly and monthly exams And laboratory reports
27	2	Analysis by electrochemical methods		Lecture + Laboratory	Weekly and monthly exams And laboratory reports
28	2	Exam	Exam	Lecture + Laboratory	Weekly and monthly exams And laboratory reports
29	2	Voltage measurements		Lecture + Laboratory	Weekly and monthly exams And laboratory reports
30	2	Exam		Lecture + Laboratory	Weekly and monthly exams And laboratory reports
31	2	Final exams (practical)		Lecture + Laboratory	Weekly and monthly

		according to the university calendar			exams And laboratory reports
32	2	Final exams according to the university calendar		Lecture + Laboratory	Weekly and monthly exams And laboratory reports

11 Course Evaluation

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

12 Learning and Teaching Resources

Required textbooks (curricular books, if any)	Instrumental chemical analysis: Written by A. Dr. Abdul Mohsen Abdul Hamid Al-Haidari
Main references (sources)	-Instrumental chemical analysis: Written by A. Dr. Abdul Mohsen Abdul Hamid Al-Haidari, -Robert. L.Pecsok "Modern methods of chemical Analysis", Wiley, New York, ©1976,
Recommended books and references (scientific journals, reports...)	-Skoog D.; West d. Holler F. and Crouch S. "Fundamental of Analytical Chemistry" ninth Ed. Thomson, USA. 2014. -R.M.verma.; analytical chemistry; theory and practice; third edition; CBC publishers & distributors; India 1997. -- Gray D. Christian "analytical Chemistry" Sixth Ed. 2004. USA, ed. Wiley
Electronic References, Websites	-Miguel Valcárcel Cases, Ángela I. López-Lorente , Ma Ángeles López-Jiménez "Foundation of Analytical Chemistry, A Teaching-Learning Approach, Springer International " Publishing AG 2018 -George M. Frame(II), Eileen M. Skelly Frame, James W. Robinson" , Instrumental Analytical Chemistry" , 2021 - Frank A. Settle " Handbook of Instrumental Techniques for Analytical Chemistry" 2007

Course Description Form

1 Course Name:					
Practical automated analysis					
2 Course Code:					
Chem.4.3.P					
3 Semester / Year:					
Year					
4 Description Preparation Date:					
5/4/2024					
5 Available Attendance Forms:					
My presence in the laboratory					
6 Number of Credit Hours (Total) / Number of Units (Total)					
36hour					
7 Course administrator's name (mention all, if more than one name)					
Name: Dr. mohammed Madlool mohammed Email: viil3986@gmil.com					
8 Course Objectives					
Course Objectives		<p>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 .</p> <p>2. To learn about the importance of automated analysis, its advantages, and the best techniques used. To learn about the laws of preparing solutions and tools and how to calibrate glassware</p> <p>3. To become familiar with the topics related to automated analysis, including concentrations and physical factors through which the concentrations substances can be estimated</p> <p>4-The student will know how to determine the maximum wavelength, construct calibration curve, and estimate the concentrations of solutions of unknown concentration</p>			
9 Teaching and Learning Strategies					
Strategy		Lectures using modern means of presentation and explanation using the blackboard clarify the laws, using relevant videos, using the Excel program for the purpose drawing calibration curves, using the method of discussion, question and answer, joint work with students on the practical side, and performing practical experiments understand this science and its components.			
10 Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h		Introduction	In-person lecture practical	Daily exams, reports, papers, semester and

		Introducing automated analysis, its features, and the laws of preparing concentrates		application in the laboratory	final exams
2	3h	Learn about standard glassware and how to calibrate them	Calibration glassware	In-person lecture practical application in the laboratory	
3	3h	Know how the concentration of an unknown solution is determined by knowing the refractive index of the solution	Determine the index of refraction		
4	3h	Find out how the concentration of an unknown solution is determined by measuring and determining its angle of rotation	Polarization measurement optical effectiveness	In-person lecture practical application in the laboratory	
5	3h	Knowledge of the regions of the spectrum, the range of wavelengths used in each region, electronic excitation, and types of electrons	Ultraviolet spectroscopy		
6	3h	Identify spectroscopic analysis devices, their parts and types	Spectrophotometric analysis devices	In-person lecture practical application in the laboratory	
7	3h	On Beer-Lambert's law and the causes of deviation from the straight line equation and how to treat it	Deviation from Beer-Lambert law		
8	3h	Knowing the maximum wavelength, its usefulness, and how to benefit from it in analyzing materials	Determine maximum wavelength	In-person lecture practical application in the laboratory	

		and determining concentrations			
9	3h	Know how to prepare a series of standard solutions with increasing concentrations and measure them to construct a calibration curve	Standard calibration curve	laboratory	
10	3h	Know how to prepare a ferric ion concentration series and construct a standard calibration curve	Determine concentration of unknown solution the ferric ion	In-person lecture practical application in the	
11	3h	Determine the concentration of a solution containing a mixture of substances	Spectral analysis of mixture permanganate and potassium dichromate	laboratory	
12	3h	Identify colloidal solutions and how the beam behaves when it passes through them	Scattering and turbidity experiment	In-person lecture practical application in the	

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 spectroscopic methods
Main references (sources)	Instrumental analysis d. Abdul Mohsen Al-Haidari
Recommended books and references (scientific journals, reports...)	Skoog
Electronic References, Websites	https://www.chemspider.com https://asplib.org

Course Description Form

1. Course Name:					
Industrial chemistry					
2. Course Code:					
Chem.4.4.					
3. Semester / Year:					
Year					
4. Description Preparation Date:					
29/3/2024					
5. Available Attendance Forms:					
Daily					
6. Number of Credit Hours (Total) / Number of Units (Total)					
36					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Taiseer Abdul-Kader Saleh					
Email: taiseer@uosamarra.edu.iq					
8. Course Objectives					
Course Objectives			Studying of polymerization system for different polymers, their preparation methods ,their classification, study of their features and most important 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+ 2Practical	Introduction to polymers	Learning about industrial chemistry	Lecture and laboratory	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 of 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 , cationic)	=	=
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 M.W. calculation	Number Average M.W , weight average M.W. and Viscosity average M.W.	=	=
19	=	Thermal transition states of polymers	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:	
Quantum chemistry/fourth stage	
2 Course Code:	
Chem.4.5.	
3 Semester / Year:	
The first and second / annually	
4 Description Preparation Date:	
1/4/2024	
5 Available Attendance Forms:	
Daily	
6 Number of Credit Hours (Total) / Number of Units (Total):	
50 hours/4 units	
7 Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Liqaa Hussein Alwan	
Email: liqaa.alsamarrai@gmail.com	
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	
Strateg	<p>A- Cognitive objectives</p> <p>A-1 The student's knowledge of modern quantum theory</p> <p>A-2 Introducing the student to the hypotheses of quantum theory</p> <p>A-3 The student's knowledge of some models applied to modern quantum theory</p> <p>B - The skill objectives of the course</p> <p>1 - The student must master some mathematical skills in order to find solutions to some problems</p> <p>2- To memorize the hypotheses of Schrödinger's quantum theory.</p> <p>3- To derive the Schrodinger equation B-4 To apply the Schrodinger equation to some systems</p> <p>C- Teaching and learning methods</p> <p>1 Lectures</p> <p>2- Illustration means, such as: the smart board, the regular board, and whiteboard pens.</p> <p>3- Use the calculator</p> <p>D_Evaluation methods</p> <p>1- Oral exams</p> <p>2-Monthly exams</p>

<p>3- Annual exams</p> <p>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</p> <p>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.</p>
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10 Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	Quantum theory	Reasons for the failure of ancient quantum theory	The lecture	Weekly and monthly exams
2	2 Theoretical	Quantum theory	Black body radiation	The lecture	Weekly and monthly exams
3	2 Theoretical	Quantum theory	Atomic spectra	The lecture	Weekly and monthly exams
4	2 Theoretical	Quantum theory	photoelectric phenomeno	The lecture	Weekly and monthly exams
5	2 Theoretical	Quantum theory	Hydrogen atom	The lecture	Weekly and monthly exams
6	2 Theoretical	Exam	Exam	The lecture	Weekly and monthly exams
7	2 Theoretical	Modern quantum theory	The first hypothesis is the quantum state function of the system.	The lecture	Weekly and monthly exams

8	2 Theoretical	Modern quantum theory	The second hypothesis: Influences	The lecture	Weekly and monthly exams
9	2 Theoretical	Modern quantum theory	The third hypothesis: intrinsic function and intrinsic value	The lecture	Weekly and monthly exams
10	2 Theoretical	Modern quantum theory	The fourth hypothesis is the average value or the expected value.	The lecture	Weekly and monthly exams
11	2 Theoretical	Exam	Exam	The lecture	Weekly and monthly exams
12	2 Theoretical	Modern quantum theory	Fifth hypothesis	The lecture	Weekly and monthly exams
13	2 Theoretical	Schrödinger equation	Derivation of the Schrödinger equation	The lecture	Weekly and monthly exams
14	2 Theoretical	Schrödinger equation	Derivation of the Schrödinger equation	The lecture	Weekly and monthly exams
15	2 Theoretical	half year holiday	half year holiday	The lecture	Weekly and monthly exams
16	2 Theoretical	Applying the Schrödinger equation	Types of movements in corn	The lecture	Weekly and monthly exams
17	2 Theoretical	Applying the Schrödinger equation	transitional movement	The lecture	Weekly and monthly exams
18	2 Theoretical	Applying the Schrödinger equation	Energy quantization	The lecture	Weekly and monthly exams
19	2 Theoretical	Applying the Schrödinger equation	Decay	The lecture	Weekly and monthly

		equation			exams
20	2 Theoretical	Exam	Exam	The lecture	Weekly and monthly exams
21	2 Theoretical	Applying the Schrödinger equation	Vibrating movement	The lecture	Weekly and monthly exams
22	2 Theoretical	Applying the Schrödinger equation	Vibrating movement	The lecture	Weekly and monthly exams
23	2 Theoretical	Applying the Schrödinger equation	Rotary movement	The lecture	Weekly and monthly exams
24	2 Theoretical	Applying the Schrödinger equation	Rotary movement	The lecture	Weekly and monthly exams
25	2 Theoretical	Applying the Schrödinger equation	Previous equations on the hydrogen atom	The lecture	Weekly and monthly exams

11 Course Evaluation

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

12 Learning and Teaching Resources

Required textbooks (curricular books any)	- Dr. Nouri Al-Mashhadani - Quantum Chemistry - University of Baghdad Publications, Iraq.1988 Q. Abdul Karim, "Quantum Chemistry and Molecular Spectroscopy," University of Basra 1899
Main references (sources)	
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