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

Academic Program Description Form

University Name: University of Misan
Faculty/Institute: College of Science
Scientific Department: Department of Chemistry

Signature:
Dr. Mohammed A. Saeed
Head of Department Name:
Date:

Signature:
Asst.Prof.Dr. Salah H. Faraj
Scientific Associate Name:
Date:

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date: Shaima R. Bahoon
Signature:

Approval of the Dean
Asst.Prof.Dr. Tahseen Sadam Fandi

1. Program Vision

This academic program description provides a concise summary of the program's key features and the learning outcomes the student is expected to achieve, demonstrating whether the student has made the most of the opportunities available. It is accompanied by a description of each course within the program.

2. Program Mission

1. To graduate chemists and biochemists who are:
   - prepared for entrance into top-rated graduate and professional schools
   - prepared for entry-level positions in chemical industry and other chemistry-related fields
   - capable of becoming responsible, successful professionals and leaders in their chosen fields
2. To contribute to the preparation of students in other science disciplines for their careers.
3. To contribute to the improvement of scientific and technological literacy, and the development of critical-thinking and problem-solving skills of all students as preparation for the world of work and responsible citizenship.
4. To increase the number of science majors enrolled in non-required chemistry courses and graduating with chemistry minors.

3. Program Objectives

1. Advancing the level of chemistry in all fields.
2. Transferring new developments in these sciences to serve the community.
3. Raising the country's economic standing.
4. Providing relevant institutions and departments with technical and scientific cadres of recent graduates.
5. Joint cooperation with government institutions and the private sector to conduct scientific research to solve related problems.

4. Required Program Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

1. The department seeks to utilize the best modern scientific methods to deliver quality information to students through a distinguished faculty.

2. It also provides students with scientific expertise in all its branches through practical training in the department's laboratories and medical laboratories affiliated with the Ministry of Health, in joint cooperation.

B - Program Skills Objectives:

The department aims to graduate scientific cadres capable of working in:

1. **Health and educational institutions, factories, chemical laboratories, and central research laboratories.**

2. **Building students' research and analytical capabilities.**

3. **Developing students' deductive reasoning.**

4. **Teaching students how to use laboratory equipment.**

5. Teaching and learning methods

- **Explanation and clarification through lectures.**
- **Presentation of scientific material using projectors: Data Show, plasma screens.**
- **Self-learning through homework and mini-projects within lectures.**

• Daily surprise tests (quizzes) and ongoing weekly tests.

• Guiding students to resources to benefit from and expand their understanding of scientific material.

• Laboratories.

• Graduation projects.

• Scientific visits.

• Seminars and symposia held in the department.

• Summer training.

6. Assessment Methods

• Short Exams

• Homework

• Midterm and Final Exams for Theoretical and Practical Subjects

• Mini-Projects Within the Lesson

• Activity Presentations

• Midterm and Final Exams and Activities

C- Affective and Value-Based Objectives:

1. Develop the student's ability to comprehend the major and engage with it flexibly.

2. Create a sense of familiarity with the major's content.

3. Assume responsibility in serving society and the country through this major.

7. Teaching and Learning Methods

1. Conduct the lecture in a practical manner, connected to daily life, to engage the student in the subject matter without straying from the core of the topic, thus ensuring the material is flexible and amenable to understanding and analysis.

2. Assign the student some group activities and assignments.

3. Allocate a percentage of the grade to daily assignments and tests.

8. Assessment Methods

1. Active participation in the classroom is evidence of the student's commitment and responsibility.

2. Adherence to the specified deadlines for submitting assignments and research.

3. Midterm and final exams reflect commitment and achievement of knowledge and skills.

4. Daily applications, exercises, and assignments.

D - General and transferable skills (other skills related to employability and personal development).

1. Developing patriotism among students.

2. Encouraging cooperation and support among students.

3. Developing cultural and athletic awareness among students.

4. Enhancing the student's personality, developing them, and increasing their self-confidence.

9. Program Description

Year/Level	Course Name	Credit Hours	
		theoretical	practical
Third	Physical Chemistry 3	3	2
Third	Inorganic Chemistry 5	2	2
Third	Organic Chemistry 3	2	2
Third	Biochemistry 1	2	2
Third	Industrial Chemistry 1	2	-
Third	Heterocyclic Chemistry	2	-
Third	Physical Chemistry 4	3	2
Third	Inorganic Chemistry 6	2	2
Third	Organic Chemistry 4	2	2

Third	Biochemistry 2	2	2
Third	Industrial Chemistry 2	2	–
Third	Pharmaceutical Chemistry	2	–
Third	Research Methodology	1	–
Fourth	Instrumental Analysis 1	3	2
Fourth	Quantum Chemistry	3	–
Fourth	Polymer Chemistry	2	2
Fourth	Biochemistry 1	2	2
Fourth	Nanotechnology	2	–
Fourth	Instrumental Analysis 2	3	2
Fourth	Spectroscopic Identification	2	2
Fourth	Spectrochemistry	3	–
Fourth	Oil and Petrochemicals	2	2
Fourth	Biochemistry 2	2	2
Fourth	Research Project	–	2

10. Planning for Personal Development

Following up on outstanding students, supporting and guiding them, and building their mental and academic capabilities in line with their abilities and orientations in various disciplines.

11. Admission Criteria (Establishing regulations related to admission to the college or institute)

Admission requires a student who has graduated from the sixth grade of middle school, biology or applied sciences, with a GPA of no less than 80%, in addition to the possibility of special admission.

12. The most important sources of information about the program

One of the most important sources of information about the academic program is based on the established curricula and courses in the colleges and scientific departments of European and American universities. In addition, we communicate with institutions and government departments that possess chemical personnel to develop academic programs to graduate students with the experience to work in these relevant departments and institutions, as well as to support graduate programs.

Program Skills Outline															
			Required program Learning outcomes												
Year/Level	Course Name	Basic or optional	Knowledge				Skills				Ethics				
			A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	
Third	Physical Chemistry 3	Basic	✓	✓	✓		✓				✓				
Third	Inorganic Chemistry 5	Basic	✓	✓	✓		✓				✓				
Third	Organic Chemistry 3	Basic	✓	✓	✓		✓				✓				
Third	Biochemistry 1	Basic	✓	✓	✓		✓				✓				
Third	Industrial Chemistry 1	Basic	✓	✓	✓		✓				✓				
Third	Heterocyclic Chemistry	Optional	✓				✓				✓				
Third	Physical Chemistry 4	Basic	✓	✓	✓		✓				✓				
Third	Inorganic Chemistry 6	Basic	✓	✓	✓		✓				✓				
Third	Organic Chemistry 4	Basic	✓	✓	✓		✓				✓				
Third	Biochemistry 2	Basic	✓	✓	✓		✓				✓				

Third	Industrial Chemistry 2	Basic	✓	✓	✓		✓				✓			
Third	Pharmaceutical Chemistry	Optional	✓				✓				✓			
Third	Research Methodology	Basic	✓	✓	✓		✓				✓			
Fourth	Instrumental Analysis 1	Basic	✓	✓	✓		✓				✓			
Fourth	Quantum Chemistry	Basic	✓	✓	✓		✓				✓			
Fourth	Polymer Chemistry	Basic	✓	✓	✓		✓				✓			
Fourth	Biochemistry 1	Basic	✓	✓	✓		✓				✓			
Fourth	Nanotechnology	Optional	✓				✓				✓			
Fourth	Instrumental Analysis 2	Basic	✓	✓	✓		✓				✓			
Fourth	Spectroscopic Identification	Basic	✓	✓	✓		✓				✓			
Fourth	Spectrochemistry	Basic	✓	✓	✓		✓				✓			

Fourth	**Oil and Petrochemicals**	**Basic**	✓	✓	✓		✓				✓			
Fourth	**Biochemistry 2**	**Basic**	✓	✓	✓		✓				✓			
Fourth	**Research Project**	**Basic**	✓	✓	✓		✓				✓			

Course Description Form

1. Course Name: Physical Chemistry
2. Course Code: 3
3. Semester / Year: 2nd semester /2024−2025
4. Description Preparation Date:
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Majeed Abbas
8. Course Objectives

Course Objectives	1. The student will learn the basic principles of kinetic chemistry and photochemistry. 2. The student will be able to understand kinetic reactions and how to calculate the order of chemical reactions. 3. The student will be able to derive the orders of chemical reactions and distinguish between different types of reaction orders. 4. The student will be familiar with modern methods used to diagnose the kinetic orders of reactions.
9. Teaching and Learning Strategies	
Strategy	1. interactive in-person lectures 2. Demonstration aids and scientific posters 3. Use of laboratory materials and measuring devices 4. Paper manuscripts and textbooks

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Chemistry Kinetics and It Importance	Introduction to Chemist Kinetics	Lecture	Weekly and monthl reviews
2	3	Reaction Order	Rate of a Chemical Reaction	lecture	Weekly and monthly reviews
3	3	Reaction Order	Order and Molecularity	lecture	
4	3	Derivation of Overall Reaction Orders	Zero-Order Reactions	lecture	Weekly and monthl reviews
5	3	(Derivation of the Law with Examples)	First-Order Reactions	lecture	Weekly and monthl reviews
6	3	(Derivation of the Law with Examples)	First-Order Reactions	lecture	Weekly and monthl reviews
7	3	(Derivation of the Law with Examples)	Second-Order Reaction	lecture	Weekly and monthl reviews
8	3	(Derivation of the Law with Examples)	Third-Order Reactions	lecture	Weekly and monthl reviews
9	3	(Derivation of the Law w Examples)	Complex Reactions / Parallel Reactions	lecture	Weekly and monthl reviews
10	3	(Derivation of the Law w Examples)	Complex Reactions / Series Reactions	lecture	Weekly and monthl reviews
11	3	(Derivation of the Law w Examples)	Complex Reactions / Reversible Reactions	lecture	Weekly and monthl reviews
12	3	Complex Reactions / Series Reactions (Derivation of the Lav with Examples)	Complex Reactions / Series Reactions	lecture	Weekly and monthl reviews
13	3	(Temperature Coefficie & Arrhenius Equation	The Effect of Temperature on the Rate of Reaction	lecture	Weekly and monthl reviews
14	3	Active Complex Theor	Active Complex Theory	lecture	Weekly and monthl reviews
15	3	Collision Theory (Single-Molecular)	Collision Theory	lecture	Weekly and monthl reviews

11. Course Evaluation	
60 marks … monthly exams 10 marks … daily written exams 10 marks … reports 10 marks … daily oral exams 10 marks … attendance	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Kinetics and Electrochemistry, Dr. Abdul Hamid Mohammed Al-Dabbagh and Dr. Banan Ahmed Aqrawi
Main references (sources)	1. Electrochemistry, Dr. Jalal Mohammed Saleh 2. Thermodynamics and Photochemistry, Dr. Jalal Mohammed Saleh
Recommended books and references (scientific journals, reports…)	Physical Chemistry, Peter Atkins, vol. 8, 2013.
Electronic References, Websites	Scientific websites and forums in physical chemistry

13. Course Name: Organic Chemistry	
14. Course Code: 3	
15. Semester / Year: 2nd semester /2024−2025	
16. Description Preparation Date:	
17.Available Attendance Forms:	
18.Number of Credit Hours (Total) / Number of Units (Total)	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr. Tahseen Sadaam Fandi	
20. Course Objectives	
Course Objectives	1) Enable students to name organic compounds and draw structures from their names. 2) Provide students with all approved and modern methods for preparing organic compounds. 3) Enable students to propose plausible mechanisms for organic reactions. 4) Apply preparation methods and reactions in the field of scientific researc through graduation research projects.
21. Teaching and Learning Strategies	
Strategy	1- Evaluating educational and pedagogical outcomes and results that enable students to be scientifically and realistically adaptable. 2- Emphasizing the use of tools to help students understand theoretical principles and break boredom. 3- Asking students questions from time to time to ensure their understanding and adherence to the lecture. Students are also given the opportunity to present their ideas during the lecture and discuss their concerns. 4- Giving students the freedom to choose graduati research topics to harness their potential in the areas th wish to research.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	**Aldehydes and Ketones—**	1.1 Introduction Nomenclature A- Naming Aldehydes in the IUPAC System	Lecture	Weekly and monthl reviews
2	3	**Aldehydes and Ketones—**	Common Names for Aldehydes C -Naming Ketones in the IUPAC System D- Common Names for Ketones E- Additional Nomenclature Facts 1.3 Physical Properties	lecture	Weekly and monthly reviews
3	3	**Nucleophilic Addition**	The General Mechanism of Nucleophilic Addition B The Nucleophile Nucleophilic Addition of H– and R——A Review Nucleophilic Addition of –CN A- The Mechanism	lecture	
4	3	**Wittig Reaction**	The Wittig Reagent B -Mechanism of the Wittig Reaction C -Retrosynthetic Analysis	lecture	Weekly and monthl reviews
5	3	**Comparing Methods of Alkene Synthesis**	Addition of 1° Amines A- Formation of Imines Addition of 2° Amines A Formation of Enamines	lecture	Weekly and monthl reviews
6	3	**Thermodynamics of Hydrate Formation**	The Kinetics of Hydrate Formation Addition of Alcohols—Acetal Formation B- Hydrolysis of Acetals Acetals as Protecting Groups	lecture	Weekly and monthl reviews

			Cyclic Hemiacetals A- Forming Cyclic Hemiacetals B- The Conversion of Hemiacetals to Acetals		
7	3	**Carboxylic Acids and Their Derivatives**	Introduction Structure and bonding Nomenclature Physical properties Spectroscopic properties	lecture	Weekly and monthl reviews
8	3	**Carboxylic Acids and Their Derivatives**	Interesting esters and amide Introduction to nucleophilic acyl substitution Reactions of acid chlorides Reactions of anhydrides Reactions of carboxylic acids Reactions of esters	lecture	Weekly and monthl reviews
9	3	**Carboxylic Acids a Their Derivatives- Nucleophilic Acy Substitution**	Application: Lipid hydrolysis Reactions of amides Application: The mechanism of action of β-lactam antibiotics Summary of nucleophilic acyl substitution reactions	lecture	Weekly and monthl reviews
10	3	**Carboxylic Acids a Their Derivatives- Nucleophilic Acy Substitution**	Natural and synthetic fiders Biological acylation reactions Nitrile A Hydrolysis of Nitriles B Reduction of Nitriles C Addition of Grignard and Organolithium Reagents to Nitriles	lecture	Weekly and monthl reviews
11	3	**Amines**	1 Introduction 2 Structure and bonding	lecture	Weekly and monthl reviews

			3 Nomenclature 3A Primary Amines 3B Secondary and Tertiary Amines 3C Aromatic Amines 3D Miscellaneous Nomenclature Facts 4 Physical properties 5 Spectroscopic properties		
12	3	**Amines**	6. Interesting and useful amines 7 Preparation of amines 7A Nucleophilic Substitution Routes to Amines 7B Reduction of Other Functional Groups That Contain Nitrogen 7C Reductive Amination of Aldehydes and Ketones 8 Reactions of amines— General features 9 Amines as bases 10 Relative basicity of amines and other compounds	lecture	Weekly and monthl reviews
13	3	**Amines**	11. Comparing an Amine and NH3 11A Comparing an Alkylamine and an	lecture	Weekly and monthl reviews

			Arylamine 11B Comparing an Alkylamine and an Amide 11C Heterocyclic Aromatic Amines		
14	3	**Amines**	Hybridization Effects Amines as nucleophiles Hofmann elimination A Details of the Hofmann Elimination B Regioselectivity of the Hofmann Elimination	lecture	Weekly and monthl reviews
15	3	**Amines**	Substitution reactions of aryl diazonium salts A Specifi c Substitution Reactions B Using Diazonium Salts in Synthesis Coupling reactions of aryl diazonium salts Application: Synthetic dyes Application: Sulfa drugs	lecture	Weekly and monthl reviews

23. Course Evaluation

monthly exams
daily written exams
reports
daily oral exams
attendance

24. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Organic Chemistry, 2nd edition, Dr. Fahad Ali
Main references (sources)	Organic chemistry, Morrison and Boyd. Smith, J.G. "Organic chemistry", 3rd ed., Mc Graw Hill,
Recommended books and references (scientific journals, reports…)	Wade, L.G.Jr. "Organic chemistry", 6th ed Pearson Prentice Hall, 2008
Electronic References, Websites	http://www.chemicalprocessing.com Other website in organic chemistry

Course Description Form

25. Course Name:	
inorganic chemistry	
26. Course Code:	
3	
27. Semester / Year:	
Course	
28. Description Preparation Date:	
9/3/2025	
29.Description Preparation Date:	
30.Number of Credit Hours (Total) / Number of Units (Total)	
30 hr(theoretical)/ 30 hr (practical)	
31. Course administrator's name (mention all, if more than one name)	
Name: Dr. Asmaa B. Sabti Email: asmaabadr@uomisan.edu.iq	
32. Course Objectives	
Course Objectives	• **Student knowledge of coordination chemistry** • **Student knowledge of the basic concepts of coordination chemistry** • **Student's knowledge of the theories that explain coordination compounds and their importance**
33. Teaching and Learning Strategies	
Strategy	• interactive lectures • Demonstration aids and scientific posters • Use of laboratory materials and devices

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Coordination chemistry and their importance	Introduction of coordinat chemistry	lecture	Weekly and monthly exam
2	2	Nomenclature of complexes	Nomenclature of complexes/ bridge complexes/ geometrical isomers	lecture	Weekly and monthly exam
3	2	Types of ligands	types of ligands based on number of coordination bonds, how they are linked, and their formulas	lecture	Weekly and monthly exam
4	2	The most important theories that explain the formation of comple	Chain theory/ werner coordination theory	lecture	Weekly and monthly exam
5	2	Types of isomerism in complexes	Explain types of isomerism with examples	lecture	Weekly and monthly exam
6	2	Effective atomic number rule	Explain effective atomic number rule/ 18 electron rule with examples	lecture	Weekly and monthly exam
7	2	The most important Theories that explain The coordination bond	Explain valence bond theo with examples	lecture	Weekly and monthly exam
8	2	Crystal filed theory	Explanation of complexes according to the theory with examples	lecture	Weekly and monthly exam
9	2	Crystal filed theory	Distorreter complexes with examples	lecture	Weekly and monthly exam
10	2	Crystal filed theory	Factors affecting of the splitting energy	lecture	Weekly and monthly exam
		Molecular orbital theory	Pi bonding in complexes with examples	lecture	Weekly and monthly exam
12	2	Molecular orbital theory	Pi bonding in complexes with examples	lecture	Weekly and monthly exam
13	2	Factors affecting the stability of complexes	Explain Factors affecting the stability of complexes	lecture	Weekly and monthly exam
14	2	Mechanisms of substation reaction	Explain of mechanisms of substation reaction in complexes with examples	lecture	Weekly and monthly exam
15	2	Complexes reactions	Explain of complexes reaction with chemical equation	lecture	Weekly and monthly exam

35. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
36. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Inorganic Chemistry (J.E.Huheey)
Main references (sources)	Inorganic and coordination chemistry Ihsan Abdel Ghani
Recommended books and references (scientific journals, reports…)	Inorganic Chemistry (J.E.Huheey)
Electronic References, Websites	

1. Course Name:
Biochemistry 1
2. Course Code:
3. Semester / Year:
First / 2024
4. Description Preparation Date:
12-9-2024
5. Available Attendance Forms:
12-9-2024
6. Number of Credit Hours (Total) / Number of Units (Total)
30/30
7. Course administrator's name (mention all, if more than one name)
Name: Alaa Hussein Email: alaa.hussein@uomisan.edu.iq
8. Course Objectives

Course Objectives	**1. The student learns the basic vital parts of his body and the rest of living organisms.** **2. The student masters the methods of estimating the important large a small vital particles.** **3. The student masters the important vital interactions of the liv organism. 4. 4. Study and understand the diagrams of vital interactions.**

9. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Visual aids and scientific posters.** **3. Use of laboratory materials and measuring devices** **4. Paper manuscripts and textbooks**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Biochemistry and importance Introduction	Biochemistry and importance Introduction	Weekly and mon evaluations lec	Weekly and mon evaluations lec
2	2	biochemistry Parts of	biochemistry Parts of	Weekly and mon evaluations lec	Weekly and mon evaluations lec
3	2	cell and the processes	cell and the processes	Weekly and mon evaluations lec	Weekly and mon evaluations lec
4	2	which important	which important	Weekly and mon evaluations lec	Weekly and mon evaluations lec
5	2	molecules take place W	molecules take place W	Weekly and mon evaluations lec	Weekly and mon evaluations lec
6	2	and solutions Properties	and solutions Properties	Weekly and mon evaluations lec	Weekly and mon evaluations lec
7	2	water and buffer solut	water and buffer solut	Weekly and mon evaluations lec	Weekly and mon evaluations lec
8	2	Carbohydrates, t	Carbohydrates, t	Weekly and mon evaluations lec	Weekly and mon evaluations lec
9	2	functions, types	functions, types	Weekly and mon evaluations lec	Weekly and mon evaluations lec
10	2	reactions Impor	reactions Important react	Weekly and mon evaluations lec	Weekly and mon evaluations lec
11	2	reactions of carbohydra	of carbohydrates, c	Weekly and mon evaluations lec	Weekly and mon evaluations lec
12	2	color reactions and o	reactions and other react	Weekly and mon evaluations lec	Weekly and mon evaluations lec
13	2	reactions Types of m	Types of mono, di, tri	Weekly and mon evaluations lec	Weekly and mon evaluations lec
14	2	di, tri and p	poly carbohydrates Li	Weekly and mon evaluations lec	Weekly and mon evaluations lec
15	2	carbohydrates Lipids (f	(fats) their functions, ty	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		their functions, types	and reactions Types of o	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		reactions Types of o	lipids, protein lipids, wa	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		lipids, protein lipids, wa	steroid compounds	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		steroid compounds	terpenes Amino acids	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		terpenes Amino acids	peptides Introduction	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		peptides Introduction	proteins Common	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		proteins Common	essential amino a	Weekly and mon evaluations lec	Weekly and mon evaluations lec
		essential amino a	Introduction to amino a	Weekly and mon evaluations lectur	Weekly and mon evaluations lecture
		Introduction to amino a	and their role		
		and their role			

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)	Introduction to Biochemistry 2007
Main references (sources)	Biochemistry 2020 Harbar
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:	
Industrial Chemistry 1	
2. Course Code:	
3. Semester / Year:	
First / 2024	
4. Description Preparation Date:	
12-9-2024	
5. Available Attendance Forms:	
12-9-2024	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30/30	
7. Course administrator's name (mention all, if more than one name)	
Name: Hend Mahdi Saleh Email: hend.mahdi @uomisan.edu.iq	
8. Course Objectives	
Course Objectives	**-1. Providing students with the basic principles of various indust technologies and how to apply them in real-life situations.** **-2. Improving students' ability to use theoretical information and apply i practical experiments, thus facilitating students' tasks in complet graduation research or working in laboratories or refineries a graduation, whether in the public or private sector.** **-3. Developing students' capabilities in the field of scientific resea through the use of analytical measurements to evaluate water, fo products, and other products (such as quality control and measurement).** **-4. Improving students' professional and experimental skills through use of scientific experiments.**
9. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Visual aids and scientific posters.** **3. Use of laboratory materials and measuring devices** **4. Paper manuscripts and textbooks**

37. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	**introduction**	**History of Industrial Chemistry**	lecture	Weekly and mont exam
2	2	**Chemical Industries Classification Basic Concepts**	**-Outcome -Conversion Economy - Efficiency**	lecture	Weekly and monthly exam
3	2	**Influencing factors**	**Capital**	lecture	Weekly and monthly exam
4	2	-	**Production**	lecture	Weekly and monthly exam
5	2	**Chemical manufacturi processes**	**Its types Reactors used**	lecture	Weekly and monthly exam
6	2	**Catalytic processes**	**Reactors used in catalyti processes Its types**	lecture	Weekly and monthly exam
7	2	**Chemical process flov curves**	**Its types**	lecture	Weekly and monthly exam
8	2	**processes in Chemic chemical industries**	**Explain it**	lecture	Weekly and monthly exam
9	2	**Physical processes in chemical industries**	**Explain it**	lecture	Weekly and monthly exam
10	2	**Chemical manufacturi process techniques**	**Scarce**	lecture	Weekly and monthly exam
		Fuel used in industria processes	**gaseous fuel and , Solid f its types**	lecture	Weekly and monthly exam
12	2	-	**Liquid fuel and its type**	lecture	Weekly and monthly exam
13	2	**Renewable energy**	**Definition/most importar properties**	lecture	Weekly and monthly exam
14	2	-	**Solar energy**	lecture	Weekly and monthly exam
15	2	-	**Other sources of energ**	lecture	Weekly and monthly exam

1. 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

2. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Industrial Chemistry Books
Main references (sources)	Industrial Chemistry Journals

Course Description Form

38.	Course Name: Heterocyclic Chemistry
39.	Course Code: Heterocyclic Chemistry Two – Third Stage
40.	Semester / Year: First semester / 2024–2025
41.	Description Preparation Date:
42.	Available Attendance Forms:
43.	Number of Credit Hours (Total) / Number of Units (Total)
44.	Course administrator's name (mention all, if more than one name)
Name: Doctor_ Mohammed Hashim Abdulnabi Email: mohamedhashim@uomisan.edu.iq	
45.	Course Objectives
Course Objectives	• **The student learns the basic principles heterocyclic chemistry** • **Student knowledge of modern methods of heterocyclic compounds preparation.**
46.	Teaching and Learning Strategies
Strategy	Interactive in-person lectures Scientific aids and posters Paper manuscripts and textbooks

47. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Heterocyclic comp.	Introduction	A Lecture	Weekly and monthly reviews
2	2	Heterocyclic rings	Nomenclatures	A Lecture	Weekly and monthly reviews

3	2	Heterocyclic rings	Hantzsch-Weidman Nomenclature	A Lecture	Weekly and monthly reviews
4	2	Heterocyclic rings	Partial unsaturation	A Lecture	Weekly and monthly reviews
5	2	Synthesis of heterocycles	Intramolecular reaction Paal-Knorr synthesis Pyrrole, Thiophene, Furan	A Lecture	Weekly and monthly reviews
6	2	Synthesis of heterocycles	1,3-thiazoles, pyrazines, pyrimidine,	A Lecture	Weekly and monthly reviews
7	2	Nucleophilic attack of benzene	Combes method, Bischer-Napieralisky method	A Lecture	Weekly and monthly reviews
8	2	Aldol condensation reactions	Feist-Benary furan synthesis	A Lecture	Weekly and monthly reviews
9	2	Witting reaction	Ylide reaction	A Lecture	Weekly and monthly reviews
10	2	Cyclo addition reaction	Diels-Alder reaction	A Lecture	Weekly and monthly reviews
11	2	Cyclo addition reaction	Pyridine derivatives, Pyridazine derivatives, 1,3-oxazine	A Lecture	Weekly and monthly reviews
12	2	Properties of heterocyclic rings	Geometrical shapes	A Lecture	Weekly and monthly reviews
13	2	Electrophilic	N atom oxidation,	A Lecture	Weekly and monthly

		substitution reactions, Nucleophilic substitution reactions	Pyridine reduction		reviews
14	2	Chemical properties of pyrrole	Nucleophilic substitution reactions	A Lecture	Weekly and monthly reviews
15	2	Acidity and basicity properties of pyrrole	Acidity and basicity properties of pyrrole	A Lecture	Weekly and monthly reviews

48. 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

49. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Aromatic Heterocyclic chemistry, David I. , Davies oxford science publication, USA, 1992.
Main references (sources)	Organic chemistry, Morrison, 1973, USA.
Recommended books and references (scientific journals, reports…)	Aromatic Heterocyclic chemistry, David I. , Davies oxford science publication, USA, 1992.
Electronic References, Websites	Scientific websites and forums in medicinal chemistry.

Course Description Form

50. Course Name: Physical Chemistry	
51. Course Code: 4	
52. Semester / Year: 2nd semester /2024-2025	
53. Description Preparation Date: 3\7\2025	
54. Available Attendance Forms:	
55. Number of Credit Hours (Total) / Number of Units (Total)	
56. Course administrator's name (mention all, if more than one name)	
Name: Dr. Zainab Alaa Hussain Email: Zainab_alaa@ymail.com	
57. Course Objectives	
Course Objectives	• Understand the theoretical foundations of electrochemistry and photochemistry such as oxidation-reduction reactions, electrode potentials, and photon absorption. • Analyze the physical and chemical principles governing electrochemical and photochemical phenomena to understand the behavior of materials and reactions. 3. Study theoretical applications in areas such as galvanic cells, electrolysis, and photocatalysis.
58. Teaching and Learning Strategies	
Strategy	1. interactive in-person lectures 2. Demonstration aids and scientific posters 3. Use of laboratory materials and measuring devices 4. Paper manuscripts and textbooks
59. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Electrochemistry	Introduction Electrochemistry	Lecture	Weekly and monthly reviews
2	3	Electrical conductance	Equivalent conduction and Kohlrausch's law	lecture	Weekly and monthly reviews
3	3	Electrical conductance	Ionic transition and transition numbers	lecture	
4	3	Oxidation-reduction systems	Oxidation-reduction reactions and cell types	lecture	Weekly and monthly reviews
5	3	Oxidation-reduction systems	Electrodes potentia	lecture	Weekly and monthly reviews
6	3	Oxidation-reduction systems	Types of gas electrodes	lecture	Weekly and monthly reviews
7	3	Oxidation-reduction systems	Nernst equation	lecture	Weekly and monthly reviews
8	3	Oxidation-reduction systems	commercial photovoltaic cells	lecture	Weekly and monthly reviews
9	3	Surface chemistry	Corrosion and its types	lecture	Weekly and monthly reviews
10	3	Surface chemistry	Adsorption and its types	lecture	Weekly and monthly reviews
11	3	photochemistry	Introduction to Photochemistry	lecture	Weekly and monthly reviews
12	3	photochemistry	Laws of Photochemistry	lecture	Weekly and monthly reviews
13	3	photochemistry	photochemical processes	lecture	Weekly and monthly reviews
14	3	photochemistry	Molecular orbitals and types of electronic transitions	lecture	Weekly and monthly reviews

15	3	photochemistry	Electronic Spectra and the Frank-Condon Rule	lecture	Weekly and monthly reviews

60. Course Evaluation

60 marks … monthly exams
10 marks … daily written exams
10 marks … reports
10 marks … daily oral exams
10 marks … attendance

61. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Kinetics and Electrochemistry, Dr. Abdul Hamid Mohammed Al-Dabbagh and Dr. Banan Ahmed Aqrawi
Main references (sources)	3. Electrochemistry, Dr. Jalal Mohammed Sale 4. Thermodynamics and Photochemistry, Dr. Jalal Mohammed Saleh
Recommended books and references (scientific journals, reports…)	Physical Chemistry, Peter Atkins, vol. 8, 2013.
Electronic References, Websites	Scientific websites and forums in physical chemistry

62.	Course Name: Organic Chemistry
63.	Course Code: 4
64.	Semester / Year: 2nd semester /2024−2025
65.	Description Preparation Date:
66.	Available Attendance Forms:
67.	Number of Credit Hours (Total) / Number of Units (Total)
68.	Course administrator's name (mention all, if more than one name)
Name: Dr. Tahseen Sadaam Fandi	
69.	Course Objectives
Course Objectives	1) Enable students to name organic compounds and draw structures from their names. 2) Provide students with all approved and modern methods for preparing organic compounds. 3) Enable students to propose plausible mechanisms for organic reactions. 4) Apply preparation methods and reactions in the field of scientific researc through graduation research projects.
70.	Teaching and Learning Strategies
Strategy	1- Evaluating educational and pedagogical outcomes and results that enable students to be scientifically and realistically adaptable. 2- Emphasizing the use of tools to help students understand theoretical principles and break boredom. 3- Asking students questions from time to time to ensure their understanding and adherence to the lecture. Students are also given the opportunity to present their ideas during the lecture and discuss their concerns. 4- Giving students the freedom to choose graduati research topics to harness their potential in the areas th wish to research.

71. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	**Substitution Reactions of Carbonyl Compounds at the ` Carbon**	Introduction 23.2 Enols 23.2A The Mechanism of Tautomerization 23.2B How Enols React 23.3 Enolates 23.3A Examples of Enola and Related Anions	Lecture	Weekly and monthl reviews
2	3	**Substitution Reactions of Carbonyl Compounds at the ` Carbon**	The Base 23.3C General Reactions of Enolates 23.4 Enolates of unsymmetrical carbonyl compounds 23.5 Racemization at the α carbon 23.6 A preview of reactions at the α carbon	lecture	Weekly and monthly reviews
3	3	**Substitution Reactions of Carbonyl Compounds at the ` Carbon**	Halogenation at the α carbon 23.7A Halogenation in Acid 23.7B Halogenation in Base 23.7C Reactions of α-Halo Carbonyl Compounds	lecture	
4	3	**Substitution Reactions of Carbonyl Compounds at**	Direct enolate alkylation 23.8A General Features	lecture	Weekly and monthl reviews

		the ` Carbon	23.8B Alkylation of Unsymmetrical Ketones 23.8C Application of Enolate Alkylation: Tamoxifen Synthesi		
5	3	**Substitution Reactions of Carbonyl Compounds at the ` Carbon**	9 Malonic ester synthesis 23.9A Background for the Malonic Ester Synthesis 23.9B Steps in the Malonic Ester Synthesis 23.9C Retrosynthetic Analysis 23.10 Acetoacetic ester synthesis 23.10A Steps in the Acetoacetic Ester Synthesis	lecture	Weekly and monthl reviews
6	3	**Carbonyl Condensation Reactions**	The aldol reaction 24.1A General Features of the Aldol Reaction 24.1B Dehydration of the Aldol Product 24.1C Retrosynthetic Analysis	lecture	Weekly and monthl reviews
7	3	**Carbonyl Condensation Reactions**	Crossed aldol reactions 24.2A A Crossed Aldol Reaction with Two Different Aldehydes, Both	lecture	Weekly and monthl reviews

			Having ` H Atoms 24.2B Synthetically Useful Crossed Aldol Reactions		
8	3	**Carbonyl Condensation Reactions**	Useful Transformations of Aldol Products 24.3 Directed aldol reactions 24.4 Intramolecular aldol reactions 24.5 The Claisen reaction 24.6 The crossed Claisen and related reactions	lecture	Weekly and monthl reviews
9	3	**Carbonyl Condensation Reactions**	Two Useful Crossed Claisen Reactions 24.6B Other Useful Variations of the Crossed Claisen Reaction 24.7 The Dieckmann reaction 24.8 The Michael reaction 24.9 The Robinson annulation	lecture	Weekly and monthl reviews
10	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Coupling reactions of organocuprate reagents 26.1A General Features of Organocuprate Coupling Reactions 26.1B Using Organocuprate Couplings to Synthesize	lecture	Weekly and monthl reviews

			Hydrocarbons		
11	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Suzuki reaction 26.2A General Features of Reactions with Pd Catalysts	lecture	Weekly and monthl reviews
12	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Details of the Suzuki Reaction 26.3 Heck reaction	lecture	Weekly and monthl reviews
13	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Carbenes	lecture	Weekly and monthl reviews
14	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Preparation and Reactions of Dihalocarbenes 26.4 Carbenes and cyclopropane synthesis	lecture	Weekly and monthl reviews

15	3	**Carbon–Carbon Bond-Forming Reactions in Organic Synthesis**	Simmons–Smith reaction 26.6 Metathesis	lecture	Weekly and monthl reviews

72. Course Evaluation

monthly exams
daily written exams
reports
daily oral exams
attendance

73. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry, 2nd edition, Dr. Fahad Ali
Main references (sources)	Organic chemistry, Morrison and Boyd. Smith, J.G. "Organic chemistry", 3rd ed., Mc Graw Hill,
Recommended books and references (scientific journals, reports…)	Wade, L.G.Jr. "Organic chemistry", 6th ed Pearson Prentice Hall, 2008
Electronic References, Websites	http://www.chemicalprocessing.com Other website in organic chemistry

74. Course Name:
inorganic chemistry
75. Course Code:
3
76. Semester / Year:
Course
77. Description Preparation Date:
9/3/2025
78.Description Preparation Date:
79.Number of Credit Hours (Total) / Number of Units (Total)
30 hr(theoretical)/ 30 hr (practical)
80. Course administrator's name (mention all, if more than one name)
Name: Dr. Asmaa B. Sabti Email: asmaabadr@uomisan.edu.iq

81. Course Objectives	
Course Objectives	• **Student knowledge of coordination chemistry** • **Student knowledge of the basic concepts of coordination chemistry** • **Student's knowledge of the theories that explain coordination compounds and their importance**

82. Teaching and Learning Strategies	
Strategy	• interactive lectures • Demonstration aids and scientific posters • Use of laboratory materials and devices

83. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Coordination chemistry and their importance	Introduction of coordinat chemistry	lecture	Weekly and monthly exam
2	2	Nomenclature of complexes	Nomenclature of complexes/ bridge complexes/ geometrical isomers	lecture	Weekly and monthly exam
3	2	Types of ligands	types of ligands based on number of coordination bonds, how they are linked, and their formulas	lecture	Weekly and monthly exam
4	2	The most important theories that explain the formation of comple	Chain theory/ werner coordination theory	lecture	Weekly and monthly exam
5	2	Types of isomerism in complexes	Explain types of isomerism with examples	lecture	Weekly and monthly exam
6	2	Effective atomic number rule	Explain effective atomic number rule/ 18 electron rule with examples	lecture	Weekly and monthly exam
7	2	The most important Theories that explain The coordination bond	Explain valence bond theo with examples	lecture	Weekly and monthly exam
8	2	Crystal filed theory	Explanation of complexes according to the theory with examples	lecture	Weekly and monthly exam
9	2	Crystal filed theory	Distorreter complexes with examples	lecture	Weekly and monthly exam
10	2	Crystal filed theory	Factors affecting of the splitting energy	lecture	Weekly and monthly exam
		Molecular orbital theory	Pi bonding in complexes with examples	lecture	Weekly and monthly exam
12	2	Molecular orbital theory	Pi bonding in complexes with examples	lecture	Weekly and monthly exam
13	2	Factors affecting the stability of complexes	Explain Factors affecting the stability of complexes	lecture	Weekly and monthly exam
14	2	Mechanisms of substation reaction	Explain of mechanisms of substation reaction in complexes with examples	lecture	Weekly and monthly exam
15	2	Complexes reactions	Explain of complexes reaction with chemical equation	lecture	Weekly and monthly exam

84. 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	
85. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Inorganic Chemistry (J.E.Huheey)
Main references (sources)	Inorganic and coordination chemistry Ihsan Abdel Ghani
Recommended books and references (scientific journals, reports…)	Inorganic Chemistry (J.E.Huheey)
Electronic References, Websites	

1. Course Name:
Biochemistry 2
2. Course Code:
3. Semester / Year:
Second / 2024
4. Description Preparation Date:
12-9-2024
5. Available Attendance Forms:
12-9-2024
6. Number of Credit Hours (Total) / Number of Units (Total)
30/30
7. Course administrator's name (mention all, if more than one name)
Name: Alaa Hussein Email: alaa.hussein@uomisan.edu.iq
8. Course Objectives

Course Objectives	**1. The student learns the basic vital parts of his body and the rest of living organisms.** **2. The student masters the methods of estimating the important large a small vital particles.** **3. The student masters the important vital interactions of the liv organism. 4. 4. Study and understand the diagrams of vital interactions.**

9. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Visual aids and scientific posters.** **3. Use of laboratory materials and measuring devices** **4. Paper manuscripts and textbooks**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Biochemistry The biological importa of amino acid sequences Proteins Their functions, beha and estimation Proteins Their classification plasma proteins Proteins Their struct organizations, composi and properties Enzymes Introduction to the chem nature and their types Enzymes Their hypothe nomenclature and types Enzymes The influencing fact inhibition and mechan of action Vitamins Introduction and their ty Vitamins Water-soluble and soluble vitamins Nucleotides and nuc acids Introduction to nucleot and explanation of t chemical forms Nucleic acids Watson-Crick model DNA structure and physical properties Nucleic acids Mutations and the t types of ribonucleic acid Life energy, its transfer transformations, oxidation and reduc states Hormones Hormones and metab processes	Biochemistry The biological importa of amino acid sequences Proteins Their functions, behav and estimation Proteins Their classification plasma proteins Proteins 3 T structural organizati composition properties Enzymes Introduction to chemical nature and t types Enzymes Their hypothe nomenclature and types Enzymes The influencing fact inhibition and mechan of action Vitamins Introduction and t types Vitamins Water-soluble and soluble vitamins Nucleotides and nuc acids Introduction to nucleoti and explanation of t chemical forms Nucleic acids Watson-Crick model DNA structure and physical properties Nucleic acids Mutations and the th types of ribonucleic acid Life energy, its tran and transformati oxidation and reduct states Hormones Hormones and metab processes Monthly exam	Weekly and mon evaluations lec	Weekly and mon evaluations lec
2	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
3	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
4	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
5	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
6	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
7	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
8	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
9	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
10	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
11	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
12	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
13	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
14	2			Weekly and mon evaluations lec	Weekly and mon evaluations lec
15	2			Weekly and mon evaluations lectur	Weekly and mon evaluations lecture

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)	Introduction to Biochemistry 2007
Main references (sources)	Biochemistry 2020 Harbar
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

10. Course Name:
Industrial Chemistry 2
11. Course Code:
12. Semester / Year: 2024-2025
Second / 2024
13. Description Preparation Date:
12-9-2024
14.Available Attendance Forms:
12-9-2024
15.Number of Credit Hours (Total) / Number of Units (Total)
30/30
16. Course administrator's name (mention all, if more than one name)
Name: Hend Mahdi Saleh Email: hend.mahdi @uomisan.edu.iq
17. Course Objectives

Course Objectives	**-1. Providing students with the basic principles of various indust technologies and how to apply them in real-life situations.** **-2. Improving students' ability to use theoretical information and apply i practical experiments, thus facilitating students' tasks in complet graduation research or working in laboratories or refineries a graduation, whether in the public or private sector.** **-3. Developing students' capabilities in the field of scientific resea through the use of analytical measurements to evaluate water, fo products, and other products (such as quality control and measurement).** **-4. Improving students' professional and experimental skills through use of scientific experiments.**

18. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Visual aids and scientific posters.** **3. Use of laboratory materials and measuring devices** **4. Paper manuscripts and textbooks**

86. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	**Industrial water**	**Definition of water and i sources/uses/difficulties arising from its use**	lecture	Weekly and mont exam
2	2	**Water hardness**	**Types of hardship and t most important treatme processes**	lecture	Weekly and monthly exam
3	2	**Boiler water**	**Boiler water treatmer**	lecture	Weekly and monthly exam
4	2	**Corrosion**	**Definition of corrosion / causative factors**	lecture	Weekly and monthly exam
5	2	**Corrosion mechanisr**	**Explanation / Types o corrosion**	lecture	Weekly and monthly exam
6	2	**Chemical industries**	**Soap making**	lecture	Weekly and monthly exam
7	2	-	**Types of soap**	lecture	Weekly and monthly exam
8	2	-	**Pesticide industry**	lecture	Weekly and monthly exam
9	2	-	**Types of pesticides**	lecture	Weekly and monthly exam
10	2	-	**Cement industry**	lecture	Weekly and monthly exam
		-	**Types of cement**	lecture	Weekly and monthly exam
12	2	-	**Paint industry**	lecture	Weekly and monthly exam
13	2	**Industrial pollution**	**Air**	lecture	Weekly and monthly exam
14	2		**water**	lecture	Weekly and monthly exam
15	2	-	**soil**	lecture	Weekly and monthly exam

3. 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	
4. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Industrial Chemistry Books
Main references (sources)	Industrial Chemistry Journals

Course Description Form

87. Course Name: Drug Chemistry

88. Course Code: Drug Chemistry Three – Third Stage

89. Semester / Year: Second semester / 2024–2025

90. Description Preparation Date:

91. Available Attendance Forms:

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

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

Name: Doctor_ Mohammed Hashim Abdulnabi
Email: mohamedhashim@uomisan.edu.iq

94. Course Objectives

Course Objectives	• **The student learns the basic principles of medici chemistry** • **Student knowledge of modern methods of how enzymes work**

95. Teaching and Learning Strategies

Strategy	Interactive in-person lectures Scientific aids and posters Paper manuscripts and textbooks

96. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Medicinal chemistry and its importance	Introduction to Medicinal chemistry	A Lecture	Weekly and monthly reviews
2	2	Where do drugs work?	Proteins, lipids, nucleic acids	A Lecture	Weekly and monthly reviews

3	2	Protein structure	Primary, secondary, tertiary, quaternary of protein	A Lecture	Weekly and monthly reviews
4	2	Drug development	Synthesis of analogues	A Lecture	Weekly and monthly reviews
5	2	Drug action at enzymes	Enzymes as catalysts	A Lecture	Weekly and monthly reviews
6	2	Drug action at enzymes	Catalytic role of enzymes	A Lecture	Weekly and monthly reviews
7	2	Drug action at receptors	Receptor role	A Lecture	Weekly and monthly reviews
8	2	Drug action at receptors	Receptors	A Lecture	Weekly and monthly reviews
9	2	Drug action at receptors	How does a receptor change shape	A Lecture	Weekly and monthly reviews
10	2	Nucleic acids	Structure of DNA, Drug action at nucleic acids	A Lecture	Weekly and monthly reviews
11	2	Nucleic acids	Alkylation agents, Drugs acting by chain cutting	A Lecture	Weekly and monthly reviews
12	2	Antibacterial agents	Bacterial cell, Mechanisms of antibacterial action	A Lecture	Weekly and monthly reviews
13	2	Antibacterial agents	Antibacterial agents which inhibit cell wall synthesis, penicillin analogues	A Lecture	Weekly and monthly reviews
14	2	Antibacterial agents	Tackling problem of acid sensitivity	A Lecture	Weekly and monthly reviews
15	2	Antibacterial agents	Antibiotics ampicillin and	A Lecture	Weekly and monthly reviews

			amoxicillin		

97. 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

98. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Medicinal chemistry , prof. Dr. Ahmad Ali Hassan , Damascus University Publications , Faculty of Pharmacy , 2009.
Main references (sources)	Drug organic chemistry , Dr. Abdulmajed AlSa,ig
Recommended books and references (scientific journals, reports…)	Drugs Chemistry, J.S Mores, vol. 7, 2012.
Electronic References, Websites	Scientific websites and forums in medicinal chemistry.

19. Course Name:
Research Methodology
20. Course Code:
21. Semester / Year: 2024–2025
Second / 2024
22. Description Preparation Date:
12–9–2024
23.Available Attendance Forms:
12-9-2024
24.Number of Credit Hours (Total) / Number of Units (Total)
30/30
25. Course administrator's name (mention all, if more than one name)
Name: Zaidon Jawad Kadhum Email: Zaidon.Jawad @uomisan.edu.iq
26. Course Objectives

Course Objectives	1. The student will learn the basic principles of scientific research. 2. The student will be able to write scientific research. 3. The student will be able to utilize websites to access information. 4. The student will be able to utilize reference materials and periodicals the library.

27. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Explanatory materials** **3. Paper manuscripts**

99. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**1**	**Research methodology**	**Objectives of the Resear Methodology**	**lecture**	**Weekly and monti exam**
2	**1**	**Research methodology**	**Importance of the Research Methodology**	**lecture**	**Weekly and monthly exam**
3	**1**	**Research methodology**	**Features of Scientific Research**	**lecture**	**Weekly and monthly exam**
4	**1**	**Research methodology**	**Characteristics of Scient Research**	**lecture**	**Weekly and monthly exam**
5	**1**	**Research methodology**	**Types of Research According to Purpose**	**lecture**	**Weekly and monthly exam**
6	**1**	**Research methodology**	**Types of Research According to Implement Agencies**	**lecture**	**Weekly and monthly exam**
7	**1**	**Research methodology**	**Specifications of a Good Scientific Researcher**	**lecture**	**Weekly and monthly exam**
8	**1**	**Research methodology**	**Specifics of Good Scienti Research**	**lecture**	**Weekly and monthly exam**
9	**1**	**Research methodology**	**Ethics of Scientific Research**	**lecture**	**Weekly and monthly exam**
10	**1**	**Research methodology**	**Soundness of Scientific Research**	**lecture**	**Weekly and monthly exam**
	1	**Research methodology**	**The Difference Between Research and Scientific Activity**	**lecture**	**Weekly and monthly exam**
12	**1**	**Research methodology**	**Characteristics of Scient Research**	**lecture**	**Weekly and monthly exam**
13	**1**	**Research methodology**	**Types of Research According to Purpose**	**lecture**	**Weekly and monthly exam**
14	**1**	**Research methodology**	**Steps for Conducting Scientific Research**	**lecture**	**Weekly and monthly exam**
15	**1**	**Research methodology**	**Steps for Conducting Scientific Research**	**lecture**	**Weekly and monthly exam**

5. 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

6. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Scientific Research Methodology, Dr. Qasim Matar Abdul Khalidi
Main references (sources)	Books on Research Methodology

28. Course Name:
Polymer Chemistry
29. Course Code:
30. Semester / Year: 2024–2025
First / 2024
31. Description Preparation Date:
12–9–2024
32.Available Attendance Forms:
12-9-2024
33.Number of Credit Hours (Total) / Number of Units (Total)
30/30
34. Course administrator's name (mention all, if more than one name)
Name: Hend Mahdi Saleh Email: hend.mahdi @uomisan.edu.iq
35. Course Objectives

Course Objectives	**–1. Providing students with the basic principles of various indust technologies and how to apply them in real–life situations.** **–2. Improving students' ability to use theoretical information and apply i practical experiments, thus facilitating students' tasks in complet graduation research or working in laboratories or refineries a graduation, whether in the public or private sector.** **–3. Developing students' capabilities in the field of scientific resea through the use of analytical measurements to evaluate water, fo products, and other products (such as quality control and measurement).** **–4. Improving students' professional and experimental skills through use of scientific experiments.**

36. Teaching and Learning Strategies	
Strategy	**1. Interactive in-person lectures** **2. Visual aids and scientific posters.** **3. Use of laboratory materials and measuring devices** **4. Paper manuscripts and textbooks**

100. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	**Introduction to Polymer**	**Meaning of the word Degree of polymer polymerization and polymerization process**	lecture	Weekly and mont exam
2	2	**Naming polymers**	**Polymer based Naming / nomenclatu Trade or copolymers familiar name**	lecture	Weekly and monthly exam
3	2	**Polymer classificatio**	**: According to its sour polymer chains** Shape	lecture	Weekly and monthly exam
4	2	-	**According to the technological classificati of polymer**	lecture	Weekly and monthly exam
5	2	**molecular weight of polymer**	**Types of polymer molecular weights**	lecture	Weekly and monthly exam
6	2	**properties and therm of polymer**	**melting point and glas transition point**	lecture	Weekly and monthly exam
7	2	**Classification of polymerization reactions**	**-Additive polymerizati condensation polymerization**	lecture	Weekly and monthly exam
8	2	**addition polymerizat**	**radicals / with Free explanation of polymerization steps ar examples**	lecture	Weekly and monthly exam
9	2	-	**With positive ionic explanation of polymerization steps ar examples**	lecture	Weekly and monthly exam
10	2	-	**With negative ion explanation of polymerization steps ar examples**	lecture	Weekly and monthly exam
		condensation polymerization	**Polymerization steps**	lecture	Weekly and monthly exam
12	2	-	**Condensation polymerization mechan**	lecture	Weekly and monthly exam
13	2	-	**The most important condensation polymer**	lecture	Weekly and monthly exam
14	2	**copolymers**	**Its types**	lecture	Weekly and monthly exam
15	2	**Polymerization processes**	**Polymerization system and conditions**	lecture	Weekly and monthly exam

7. 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	
8. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Industrial Chemistry Books
Main references (sources)	Industrial Chemistry Journals

Course Description Form

1. Course Code: Biochemistry 3

2. Semester / Year: Semester(1 st)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Israa Qusay Falih
Email: israaqusai@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1. Introducing students to the metabolism of essential biomolecules in the body, su as carbohydrates, proteins, fats, and others, and how they are metabolized a converted into bioenergy, which the human body uses to perform various v functions, such as growth and reproduction.** **2. Enabling students to understand the biological basis of metabolic reactions wit the body, thus enabling them to understand the metabolic pathway disorders that le to disease.** **3. Providing students with all the necessary information related to biochemistry, wh qualifies them to work and conduct research in all areas of biochemistry.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aids

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Vitamins	Prelude to vitamins, Biological origin, classification, and types.	Lecture	Weekly and monthly evaluations
2	2	Vitamins	Water-soluble vitamins: B complex &C, thei structures, The reactions stimulated by these vitamins, Deficiency symptoms, and their associated diseases.	Lecture	Weekly and monthly evaluations
3	2	Vitamins	Fat-soluble vitamins: A,D,K,E; dysfunction diseases associated with their excess and deficiency.	Lecture	Weekly and monthly evaluations
4	2	Vitamins	Synthesis reactions of: heme, tryptophan, and epinephrine using vitamins as coenzy	Lecture	Weekly and monthly evaluations
5	2	Hormones	Prelude to hormones; their classification, mechanism of action, target tissues.	Lecture	Weekly and monthly evaluations
6	2	Hormones	Pancreatic hormones (chemical structure, mechanism of action, types of receptors, a diseases associated with dysfunction of their secretion)	Lecture	Weekly and monthly evaluations
7	2	Hormones	Thyroid hormones (chemical structure, mechanism of action, types of receptors, a diseases associated with dysfunction of their secretion)	Lecture	Weekly and monthly evaluations
8	2	Hormones	Adrenergic hormones (chemical structure mechanism of action, types of receptors, a diseases associated with dysfunction of their secretion)	Lecture	Weekly and monthly evaluations
9	2	Energetics a Biological oxidation	Prelude of energy at biochemistry, energy storage molecules, phosphorylation and biological oxidation and their reactions.	Lecture	Weekly and monthly evaluations
10	2	Energetics a Biological oxidation	Metabolism of Carbohydrate, Digestion, absorption, metabolism, anaerobic and aerobic oxidation of glucose.	Lecture	Weekly and monthly evaluations
11	2	Energetics and Biological oxidation	Glycogen synthesis reactions, glycogenoly reactions Glucose synthesis reactions (Gluconeogenesis)	Lecture	Weekly and monthly evaluations
12	2	Energetics and Biological oxidation	Metabolic reactions of fructose, mannose, and Galactose. Pentose phosphate pathway. Glucose metabolism disorder (diabetes).	Lecture	Weekly and monthly evaluations
13	2	Fatty Acid a Lipid Metabolism	Prelude to Lipids: their types , functions, digestion, absorption, transport via lipoprotein, and Lipids metabolism disorders.	Lecture	Weekly and monthly evaluations

14	2	Fatty Acid a Lipid Metabolism	Oxidation reactions of saturated and unsaturated fatty acids (odd or even) Beta-oxidation of fatty acids/Calculation o energy released from beta-oxidation of fat acids	Lecture	Weekly and monthly evaluations
15	2	Fatty Acid a Lipid Metabolism	Fatty acid synthesis reactions (Fatty acid synthesis / Fatty acid synthesis / Elongati of fatty acids). Starving, Fasting states and ketone body formation.	Lecture	Weekly and monthly evaluations

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Biochemistry – Lehninger.
Main references (sources)	• Martin Crook .Clinical Biochemistry and Metabolic Medicine, Edition8. (2013).
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Code: Instrumental Analysis 1

2. Semester / Year: Semester(1 st)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Dr. Zaidon Tarik Hashim
Email: zaidon.alaqbi@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1- The course on instrumental analysis methods is determined according to curriculum prepared by the Chemistry Department.** **2- The objective of the study is to provide a comprehensive and clear introduction the fundamentals of instrumental analytical chemistry.** **3- A description of electrochemical analysis techniques and their applications.** **4- A comprehensive knowledge of electrode types and their applications.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Introduction	Introduction to Analytical Chemistry (Instrumental Analysis) Methods of Expressing Concentrations	Lecture	Weekly and monthly evaluations
2	3	Photoanalysis	Principles of Photoanalysis	Lecture	Weekly and monthly evaluations
3	3	Photoanalysis	Regions of Electromagnetic Radiation Electromagnetic Spectrum	Lecture	Weekly and monthly evaluations
4	3	Photoanalysis	Atomic Spectra Molecular Spectra Electronic Transitions	Lecture	Weekly and monthly evaluations
5	3	Equipment Used in Photoanalysis	Components and Construction of Spectrophotometers	Lecture	Weekly and monthly evaluations
6	3	Equipment Used in Photoanalysis	Radiation Energy Sources Wavelength Standards	Lecture	Weekly and monthly evaluations
7	3	UV and Visible Absorption	Quantitative Analysis by Absorption of Electromagnetic Radiation Beer-Lambert Law	Lecture	Weekly and monthly evaluations
8	3	UV and Visible Absorption	Applications of Beer-Lambert Law	Lecture	Weekly and monthly evaluations
9	3	UV and Visible Absorption	Deviation from Beer-Lambert Law	Lecture	Weekly and monthly evaluations
10	3	Introduction to Electrochemical Methods	Introduction to Electrochemical Metho	Lecture	Weekly and monthly evaluations
11	3	Introduction to Electrochemical Methods	Introduction to Electrochemical Metho Potentiometry	Lecture	Weekly and monthly evaluations
12	3	Introduction to Electrochemical Methods	Potential Measurements (Voltage Measurement)	Lecture	Weekly and monthly evaluations
13	3	Introduction to Electrochemical Methods	Ion-Selective Electrodes Electrode Applications	Lecture	Weekly and monthly evaluations
14	3	Introduction to Electrochemical Methods	Electrodeposition and Faraday's Law Amperometric Method	Lecture	Weekly and monthly evaluations
15	3	Introduction to Electrochemical	Applications of the Amperometric Meth Electrical Conductivity and Its	Lecture	Weekly and monthly

		Methods	Applications		evaluations

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Instrumental analysis, Dr. Abdul Mohsen Al-Haidari others, University of Baghdad**
Main references (sources)	**Instrumental analysis, Dr. Abdul Mohsen Al-Haidari others, University of Baghdad**
Recommended books and references (scientific journals, reports…)	**Joseph wang Analytical Chemistry (electrochemical) by willy**
Electronic References, Websites	Scientific websites and forums analytical chemistry

Course Description Form

1. Course Code: Quantum Chemistry

2. Semester / Year: Semester(1 st)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Prof. Dr. Ali Kareem Abdulhasen
Email: ali.kareem@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1. The student will understand the concept of quantum chemistry.** **2. The student will understand gases and ideal gases.** **3. The student will understand the properties of gases.** **4. The student will understand the most important properties of gases, their reactio and their compounds.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Chapter One	Linear and vector operators	Lecture	Weekly and monthly evaluations
2	3	Chapter One	Blackbody radiation, Planck's distribution law, photoelectric effect	Lecture	Weekly and monthly evaluations
3	3	Chapter One	Atomic spectra, matter waves, and Heisenberg's principle of indeterminacy	Lecture	Weekly and monthly evaluations
4	3	Chapter One	Quantum mechanics and the Schrödinge equation: interpretation of the function	Lecture	Weekly and monthly evaluations
5	3	Chapter Two	Hypotheses of modern quantum theory	Lecture	Weekly and monthly evaluations
6	3	Chapter three	Exact solutions of the Schrödinger equation for some simple systems: particle in a box	Lecture	Weekly and monthly evaluations
7	3	Chapter three	Harmonic oscillator	Lecture	Weekly and monthly evaluations
8	3	Chapter three	First month exam	Lecture	Weekly and monthly evaluations
9	3	Chapter three	Rigid rotor	Lecture	Weekly and monthly evaluations
10	3	Chapter three	Hydrogen atom	Lecture	Weekly and monthly evaluations
11	3	Chapter Four	Approximation methods in quantum chemistry: variation methods	Lecture	Weekly and monthly evaluations
12	3	Chapter Four	Time-independent perturbation metho	Lecture	Weekly and monthly evaluations
13	3	Chapter Four	Schrödinger equation for many-electron atoms: the self-contained field method, silicon atomic orbitals	Lecture	Weekly and monthly evaluations
14	3	Chapter Four	Second month exam	Lecture	Weekly and monthly evaluations
15	3	Chapter Four	Structure method for molecular orbitals	Lecture	Weekly and monthly

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Microwave (Rotational) Spectroscopy** **Prof. Tarek A. Fayed**
Main references (sources)	**Microwave (Rotational) Spectroscopy** **Prof. Tarek A. Fayed**
Recommended books and references (scientific journals, reports…)	**Elementary molecular quantum mecha** **Mathematical methods and applications**
Electronic References, Websites	Files explaining the subject in P and PPT format from the Internet.

Course Description Form

1. Course Code: Nanotechnology

2. Semester / Year: Semester(1 st)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

5. Number of Credit Hours (Total) / Number of Units (Total) = 30

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

Name: Asst. Prof. Dr. Ali Taha Salih
Email: ali.taha@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1. Describe the global importance of nanotechnology and its applications.** **2. Identify key events in the development of biotechnology and nanotechnology.** **3. Understand the properties of materials at the nanoscale.** **4. Understand the principles underlying advanced computational and experimer techniques for studying nanomaterials.** **5. Explain the broad categories of processes and applications of biotechnology a nanotechnology.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Nanochemistry	Nanochemistry, Nanoscale, Size of Selec Nanomaterials, Size of Biological Structures, Nanomaterials	Lecture	Weekly and monthly evaluations
2	2	Nanomaterial Preparation Methods,	Preparation Methods, Nanofabrication, What is Nanomaterial?, Chemical, Physi Biological Methods, Synthesis of Magne Nanoparticles	Lecture	Weekly and monthly evaluations
3	2	Nanomaterial Preparation Methods	Chemical Deposition, Sol-Gel Process	Lecture	Weekly and monthly evaluations
4	2	Nanotechnology	, Nanoscale of Different Materials, Wavelengths of Spectral Colors, Optica Properties Directly Dependent on Size	Lecture	Weekly and monthly evaluations
5	2	Nanoparticle Classification	Nanoparticle Classification, Organic NF Carbon-based NPs, Inorganic NPs	Lecture	Weekly and monthly evaluations
6	2	Nanoparticles	Nanoparticles: Why NANO? Quantum dots (QDs), Nanoparticles, Carbon-Bas Nanoparticles	Lecture	Weekly and monthly evaluations
7	2	Types of Nanoparticles	Types of Nanoparticles: Fullerene, Nanotubes, Nanotube Samples, Cerami Nanoparticles, Metal Nanoparticles	Lecture	Weekly and monthly evaluations
8	2	Types of Nanoparticles	Types of Nanoparticles: Semiconducto Nanoparticles, Polymeric Nanoparticle Lipid Nanoparticles	Lecture	Weekly and monthly evaluations
9	2	The Future of Nanotechnology	The Future of Nanotechnology: The Impact of Nanoparticles on the Future Nanotechnology	Lecture	Weekly and monthly evaluations
10	2	Nanoparticle Characterization	Nanoparticle Characterization, Electro Microscopy, Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM)	Lecture	Weekly and monthly evaluations
11	2	Nanoparticle Characterization	A Summary of the Key Differences Between the Scanning Electron Microscope and the Transmission Electron Microscope (TEM).	Lecture	Weekly and monthly evaluations
12	2	Applications of Nanotechnology	Applications of Nanotechnology, Medicine, Nanomedicine - What Is It? Applications of Nanoparticles	Lecture	Weekly and monthly evaluations
13	2	Nanomedicine	Nanomedicine, Drug Delivery Method, Disease Detection, Cancer/Virus Detection	Lecture	Weekly and monthly evaluations
14	2	Nanomedicine	Gene Detection, Carbon and Nanotechnology, What Is a Carbon	Lecture	Weekly and monthly

			Nanotube, Carbon Forms		evaluations
15	2	Nanomedicine	Carbon Nanoparticles and Balls, Carbo Nanoparticle Samples 60, Properties o Nanotoxinology	Lecture	Weekly and monthly

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Concept of nanochemistry By ;Ludovico Cademartiri and Geoffrey A. Ozin**
Main references (sources)	**Nanomaterials and Nanochemistry By; C. Br´echignac P. Houdy M. Lahmani**
Recommended books and references (scientific journals, reports…)	**Nanoparticles From Theory to Applicat by :Gunter Schmid**
Electronic References, Websites	**Files explaining the subject in PDF and P format from the Internet.**

Course Description Form

1. Course Code: Biochemistry 2

2. Semester / Year: Fourth / Semester(2nd)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Israa Qusay Falih
Email: israaqusai@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1. Introducing students to the metabolism of essential biomolecules in the body, su as carbohydrates, proteins, fats, and others, and how they are metabolized a converted into bioenergy, which the human body uses to perform various v functions, such as growth and reproduction.** **2. Enabling students to understand the biological basis of metabolic reactions wit the body, thus enabling them to understand the metabolic pathway disorders that le to disease.** **3. Providing students with all the necessary information related to biochemistry, wh qualifies them to work and conduct research in all areas of biochemistry.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aids

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Nucleic acids	Prelude to Nucleic Acids: : Nucleotides , DNA and RNA structures, DNA replication.	Lecture	Weekly and monthly evaluations
2	2	Protein synthesis	Introduction to protein synthesis, DNA transcription, translation of codons in preparation for amino acid synthesis, Mutations and Genetic Diseases	Lecture	Weekly and monthly evaluations
3	2	Proteins	Prelude to proteins; properties, classificati structural unit, structural form of proteins	Lecture	Weekly and monthly evaluations
4	2	Proteins	Protein folding, protein denaturation, differences between protein and Polypeptide chains; protein function.	Lecture	Weekly and monthly evaluations
5	2	Proteins	Digestion and absorption processes, types blood proteins.	Lecture	Weekly and monthly evaluations
6	2	Metabolism of Amino Acids	Absorption of free amino acids, nitrogen pool, nitrogen balance, amino acid catabolism.	Lecture	Weekly and monthly evaluations
7	2	Metabolism of Amino Acids	Catabolic reactions of amino acids, nitrogenous wastes-urea	Lecture	Weekly and monthly evaluations
8	2	Metabolism of Amino Acids	Nitrogenous waste - uric acid. Amino acid synthesis.	Lecture	Weekly and monthly evaluations
9	2	Metabolism of Amino Acids	Hemolysis, Jaundice, Blood diseases.	Lecture	Weekly and monthly evaluations
10	2	Enzymes	Definition of enzymes, theories of enzyme action, Factors Affecting Enzyme Activity.	Lecture	Weekly and monthly evaluations
11	2	Enzymes	Types of enzyme reactions, classification c enzymes	Lecture	Weekly and monthly evaluations
12	2	Enzymes	Mechanism of Enzymatic Catalysis.	Lecture	Weekly and monthly evaluations
13	2	Enzymes	Enzyme Inhibition: Reversible and Irreversible Inhibition.	Lecture	Weekly and monthly evaluations
14	2	Enzymes	Regulation of Enzymatic activity.	Lecture	Weekly and monthly evaluations
15	2	Enzymes	Isozymes, Disorders of enzyme secretion	Lecture	Weekly and

					monthly evaluations

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Biochemistry – Lehninger.
Main references (sources)	• Martin Crook .Clinical Biochemistry and Metabolic Medicine, Edition8. (2013).
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Code: SpectroChemistry

2. Semester / Year: Fourth / Semester(2nd)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Prof. Dr. Ali Kareem Abdulhasen
Email: ali.kareem@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1. The student will understand the concept of spectro chemistry.** **2. The student will understand gases and ideal gases.** **3. The student will understand the properties of gases.** **4. The student will understand the most important properties of gases, their reactio and their compounds.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Chapter One	Principles of Spectroscopy: Interactions between Electromagnetic Radiation and Matter	Lecture	Weekly and monthly evaluations
2	3	Chapter One	Molecular Spectroscopy of Diatomic Molecules: Rotational Spectra	Lecture	Weekly and monthly evaluations
3	3	Chapter One	Vibrational Spectra and Some Problems	Lecture	Weekly and monthly evaluations
4	3	Chapter One	Rotational/Vibrational Spectra and Som Problems	Lecture	Weekly and monthly evaluations
5	3	Chapter Two	Electronic Spectra	Lecture	Weekly and monthly evaluations
6	3	Chapter three	Analysis of Vibrational Transitions in Electronic Spectra	Lecture	Weekly and monthly evaluations
7	3	Chapter three	Fortrat Curve, Band Head, and Exercise	Lecture	Weekly and monthly evaluations
8	3	Chapter three	Rotational Spectra of Polyatomic and Linear Molecules	Lecture	Weekly and monthly evaluations
9	3	Exam	First Month Exam	Lecture	Weekly and monthly evaluations
10	3	Chapter three	NMR Spectroscopy	Lecture	Weekly and monthly evaluations
11	3	Chapter Four	NMR Systems and Problems	Lecture	Weekly and monthly evaluations
12	3	Chapter Four	Electron Magnetic Resonance Spectroscopy (ESR)	Lecture	Weekly and monthly evaluations
13	3	Chapter Four	Applications and Problems	Lecture	Weekly and monthly evaluations
14	3	Exam	Second Month Exam	Lecture	Weekly and monthly evaluations
15	3	Chapter Four	Raman Spectroscopy	Lecture	Weekly and monthly

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Microwave (Rotational) Spectroscopy** **Prof. Tarek A. Fayed**
Main references (sources)	**Microwave (Rotational) Spectroscopy** **Prof. Tarek A. Fayed**
Recommended books and references (scientific journals, reports…)	**Elementary molecular quantum mecha** **Mathematical methods and applications**
Electronic References, Websites	Files explaining the subject in P and PPT format from the Internet.

Course Description Form

1. Course Code: Instrumental Analysis 2

2. Semester / Year: Fourth / Semester(2nd)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

45+30

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

Name: Dr. Zaidon Tarik Hashim
Email: zaidon.alaqbi@uomisan.edu.iq

7. Course Objectives

Course Objectives	**1- The course on instrumental analysis methods is determined according to curriculum prepared by the Chemistry Department.** **2- The objective of the study is to provide a comprehensive and clear introduction the fundamentals of instrumental analytical chemistry.** **3- A description of electrochemical analysis techniques and their applications.** **4- A comprehensive knowledge of electrode types and their applications.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Introduction	Introduction to Analytical Chemistry (Instrumental Analysis) Examples of finding concentrations of unknown solutions	Lecture	Weekly and monthly evaluations
2	3	Infrared Spectroscopy	Infrared Spectroscopy Infrared Absorption	Lecture	Weekly and monthly evaluations
3	3	Infrared Spectroscopy	Advantages of FTIR over IR Quantitative and Qualitative Analysis in Infrared Spectroscopy	Lecture	Weekly and monthly evaluations
4	3	Atomic spectroscopy	Atomic Spectroscopy, Principle of Operation And Applications	Lecture	Weekly and monthly evaluations
5	3	Atomic spectroscopy	Atomic Absorption Spectroscopy Types Atomic Absorption Spectroscopy	Lecture	Weekly and monthly evaluations
6	3	Atomic spectroscopy	Flame Atomic Absorption Spectroscopy Components of the Spectrometer Flame Absorption Flameless Absorption Cold Absorption	Lecture	Weekly and monthly evaluations
7	3	Atomic spectroscopy	Atomic Emission Spectroscopy Flame Atomic Emission Spectroscopy	Lecture	Weekly and monthly evaluations
8	3	Atomic spectroscopy	Flame Atomic Emission Spectroscopy Components Applications and Limitations of Flame Atomic Emission Spectroscopy	Lecture	Weekly and monthly evaluations
9	3	Atomic spectroscopy	Fluorescence and Phosphorescence	Lecture	Weekly and monthly evaluations
10	3	Chemical separatio devices	High-performance liquid chromatograp (HPLC)	Lecture	Weekly and monthly evaluations
11	3	Chemical separatio devices	HPLC applications	Lecture	Weekly and monthly evaluations
12	3	Chemical separatio devices	Gas chromatography (GC-MS)	Lecture	Weekly and monthly evaluations
13	3	Chemical separatio devices	GC-MS applications	Lecture	Weekly and monthly evaluations
14	3	Chemical separatio	Capillary electrophoresis	Lecture	Weekly and

		devices			monthly evaluations
15	3	Chemical separat devices	Capillary electrophoresis applications	Lecture	Weekly and monthly evaluations

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Instrumental analysis, Dr. Abdul Mohsen Al-Haidari others, University of Baghdad**
Main references (sources)	**Instrumental analysis, Dr. Abdul Mohsen Al-Haidari others, University of Baghdad**
Recommended books and references (scientific journals, reports…)	**Joseph wang Analytical Chemistry (electrochemical) by willy**
Electronic References, Websites	Scientific websites and forums analytical chemistry

Course Description Form

1. Course Code: Spectroscopic Identification

2. Semester / Year: Fourth / Semester(2nd)

3. Description Preparation Date: 2025

4. Available Attendance Forms: Attendance

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

30+30

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

Name: Prof. Dr. Kareem Salim Abbas
Email: kareem.salim@uomisan.edu.iq

7. Course Objectives

Course Objectives	**Teaching students organic chemical reactions and chemical structures, understand the structure of organic compounds, and how to explain the mechanism of orga reactions and their practical applications aimed at the scientific development organic chemistry.**

8. Teaching and Learning Strategies

Strategy	1- Interactive teaching method (interactive lecture) 2- Using discussion and dialogue methods, ensuring stude engagement 3- Using experiential learning by combining theoretical lectures w practical sessions 4- Using educational technologies, programs, and modern visual aid

9. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Ultraviolet Spectrometry	Introducing the Student to the Science of Ultraviolet Spectroscopy	Lecture	Weekly and monthly evaluations
2	2	Introduction Theory and Sample - handling	Introduction and Theory	Lecture	Weekly and monthly evaluations
3	2	characteristic - Absorption of Organic Compounds	Identification and Absorption of Organi Compounds	Lecture	Weekly and monthly evaluations
4	2	Infrared Spectrometry	Introducing the Student to the Science c Infrared Spectroscopy	Lecture	Weekly and monthly evaluations
5	2	Introduction Theory and - Instrumentatio n	Introduction and Theory	Lecture	Weekly and monthly evaluations
6	2	Sample handling - Interpretation of - Spectra	Interpreting Spectral Results	Lecture	Weekly and monthly evaluations
7	2	characteristic group - frequencies of Organic molecules	Identification of Functional Groups	Lecture	Weekly and monthly evaluations
8	2	proton magnetic Resonance Spectrometry	HNMR Spectroscopy	Lecture	Weekly and monthly evaluations
9	2	Introduction -	Introduction	Lecture	Weekly and monthly evaluations
10	2	Theory and Apparatus	Theory and Apparatus	Lecture	Weekly and monthly evaluations
11	2	Sample handling	Sample Preparation	Lecture	Weekly and monthly evaluations
12	2	Chemical Shift an Simple Spin-Spin Coupling	Chemical Shift and Coupling Coefficient	Lecture	Weekly and monthly evaluations
13	2	Introduction -	C13NMR Spectroscopy	Lecture	Weekly and monthly

					evaluations
14	2	Theory and Apparatus	C13NMR Spectroscopy	Lecture	Weekly and monthly evaluations
15	2	Elemental Analys CHN	Elemental Analysis (CHN)	Lecture	Weekly and monthly evaluations

10. Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Organic Diagnosis, authored by Professor Mahmoud Shaker Al-Tamimi, University of Dhi Qar, College of Science**
Main references (sources)	**R.T. Morrisson and R.N. Boyd, "Organic Chemistry", 6th ed,. Paramount Communication Company .(1992)** **A.I.Vogel, "Text Book of Practical Organic Chemistry", 3rd ed., Longman Group Ltd., London (1974).** **D.J. Raber and N.K. Raber", Organic Chemistry", West Publishing Company (1988).**
Recommended books and references (scientific journals, reports…)	**N. Rose and S. Rome, J. hem. Educ., 1970, 47, 649.** **Austria Patent, 234, 511, Nov. 16, 1880.** **United State Patent 4, 145, 349 Mar. 20, 1979.** **United State Patent 4, 464, 537 Aug. 7, 1984.**
Electronic References, Websites	Scientific websites and forums organic chemistry

Course Description Form

101. Petroleum and Petrochemical Industry (Four stage)
Missan university – Science of college
102. Course Code: c
Chemistry department
103. Semester / Year: Fourth / 2nd symester
Petroleum and Petrochemical Industry (Four stage)
104. Description Preparation Date:
My presence
105. Available Attendance Forms:
My class
106. Number of Credit Hours (Total) / Number of Units (Total)
30 hours theoretical +30 hours of work
107. Course administrator's name (mention all, if more than one name)
Name: Asst.Prof.Dr. Ahmed Majeed Abbas Email: ahmed.majeed@uomisan.edu.iq
108. Course Objectives

Course Objectives	• **The student learns basic concepts in petroleum chemis and petrochemical industries .** • **The student should be able know the components a physical and chemical proper of Crude oil** • **The students' knowledge Crude oil refining operations .**

109. Teaching and Learning Strategies	
Strategy	Enabling the student to know the theory of petroleu chemistry and petrochemical industries .

110. Course Structure

Week	Hours	Required Learning	Unit or subject	Learning	Evaluation

		Outcomes	name	method	method
1	2	Petroleum chemistry	The importance crude oil	Lectur	Weekl and month review
2	2	Origin croude oil	Inorganic and organic Theory		
		Composition of Crude oil	Hydrocarbon and non-hydrocarbon		
		Physical properties Crude oil	(mechanisum ,photo,Thermal and Electric) properties.		
		Chemical Properties of Crude oil	(density ,Viscosity, Gas-Oil Ratio and sulpher composition		
		Preparation of Crude Oil for Refining	Insulation and Crude oil stabilization,		
		Preparation of Crude Oil for Refining	Crude oil Water removal Operations		
		Classification of Crude oil	(paraffin, Naphthen..ets)		
		Refining of Crude oil	Single and Double stage Distillation		
		Refining of Crude oil	Vacuum Distillation		

		Refining of Crude oil	Thermal Cracking		
		Refining of Crude oil	Thermal Cracking in the presence of auxiliary agent .		
		Refining of Crude oil	Gasoline Optimisation units.		
		Refining of Crude oil	Petroleum derivatives hydrogenation units		
		Petroleum Gases	Petrochemical products from natural gas (p.E ,P.S,PVC, ..ets)		

111. 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

112. Learning and Teaching Resources

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