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

Academic Program and Course Description for Chemistry Department College of Science at Mustansiriyah University Academic Year 2024-2025

Introduction:

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

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

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies

T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

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

Concepts and terminology:

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

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

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

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

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

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

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must

determine the learning outcomes of each course in a way that achieves the objectives of the program.

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

Academic Program Description Form

University Name: **Mustansiriyah University**

Faculty/Institute: **College of Science**

Scientific Department: **Chemistry Department**

Academic or Professional Program Name: **Bachelor degree in chemistry**

Final Certificate Name: **Bachelor degree in chemistry** (**B.Sc. in chemistry**)

Academic System: **Semester**

Description Preparation Date: **27/5/2025**

File Completion Date: **24/6/2025**

Signature:

Head of the Department:

Prof. Dr. Salah Mahdi Majeed Al-Shukri

Date: 17/7/2025

Signature:

Dean assistant of Scientific affairs

Assist. Prof. Dr. Ahmed Mahdi Rehaima

Date: 21/7/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Signature:

Assist. Prof. Dr. Ali Jasem Alhafiz

Date: 17/7/2025

Approval of the Dean

Prof. Dr. Methaq Talib Gaata

Date: 21/7/2025

1. Program Vision

The Chemistry Department at the College of Science is one of the most prominent scientific departments in the field of chemistry at the level of neighboring countries, distinguished by leadership and innovation in education and scientific research and striving to achieve the highest standards of academic excellence.

2. Program Mission

Provide high-quality education in the field of chemistry, promote scientific research to achieve scientific and technological progress, develop scientific and technical skills among students and contribute to solving environmental and health problems through sustainable education and international strategic partnerships.

3. Program Objectives

1- Promote scientific research in the fields of basic and applied chemistry.
2- Provide high-quality study programs that meet the needs of the labor market.
3- Enhance cooperation with state institutions and the private sector as well as international cooperation through fruitful research partnerships.
4- Integrate sustainable development concepts into curricula to enhance environmental and social awareness, and motivate students to innovate solutions to environmental and health problems.
5- Provide a stimulating educational environment that supports creative thinking and innovation.
6- Provide scientific consultations and analytical services to the local community and industrial companies, which enhances cooperation between the department and the community.

4. Program Accreditation

The Department of Chemistry has obtained the approval of the Ministry of Higher Education and Scientific Research – Supervision and Evaluation Authority / Quality Assurance and Academic Accreditation Department – Accreditation Department, according to their letter numbered (JD/2041) dated May 6, 2024, to accredit the Canadian Society for Chemistry (CSC) as a reliable body to grant program accreditation to the department. The department submitted all necessary requirements and files to the CSC, which in turn reviewed them and confirmed that the accreditation requirements were met, leading to the granting of preliminary approval for the program accreditation. The CSC experts were scheduled to conduct a field visit in mid-April 2025, but this visit was postponed due to the situation in the region and the lack of approval from the Canadian Ministry of Foreign Affairs for its completion.

5. Other external influences

The program is mainly sponsored by College of science and university presidency.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	2	4	4%	
College Requirements	0	0	0%	
Department Requirements	23	94	96%	

Summer Training	Elective course			Elective course
Other				Four Scientific visits

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

7. Program Description				
3rd year	MU010303501	Inorganic chemistry V	Theoretical(3)+Practical (2)	5
	MU010303502	Kinetic chemistry	Theoretical(3)+Practical (2)	5
	MU010303503	Organic chemistry III	Theoretical(3)+Practical (2)	5
	MU010303504	Biochemistry 1	Theoretical(3)+Practical (2)	5
	MU010303505	Industrial chemistry	Theoretical	2
	MU010303506	Research methodology	Theoretical	2
	MU010303601	Inorganic chemistry VI	Theoretical(3)+Practical (2)	5
	MU010303602	Electrical chemistry	Theoretical(3)+Practical (2)	5
	MU010303603	Organic chemistry V	Theoretical(3)+Practical (2)	5
	MU010303604	Biochemistry II	Theoretical(3)+Practical (2)	5
	MU010303605	Industrial chemistry II	Theoretical	2
	MU01	English	Theoretical	2
	MU010304701	Instrumental analysis I	Theoretical(3)+Practical (2)	6
	MU010304702	Identification of organic compounds I	Theoretical(3)+Practical (2)	5

4th year	MU010304703	Biochemistry III	Theoretical(3)+Practical (2)	5
	MU010304704	Polymer chemistry	Theoretical(3)+Practical (2)	5
	MU010304705	Quantum chemistry	Theoretical	3
	MU010304706	Research project	Practical (2)	2
	MU010304707	Instrumental analysis I	Theoretical(3)+Practical (2)	5
	MU010304801	Instrumental analysis II	Theoretical(3)+Practical (2)	6
	MU010304802	Identification of Organic Compounds II	Theoretical(3)+Practical (2)	5
	MU010304803	Biochemistry IV	Theoretical(3)+Practical (2)	5
	MU010304804	Pertro chemistry	Theoretical(3)+Practical (2)	5
	MU010304805	Spectroscopy chemistry	Theoretical	3
	MU010304806	selective I special topic	Theoretical	2

8. Expected learning outcomes of the program

Knowledge

1- The student is familiar with the basics of chemistry.

2- The program aims to raise students ability to the level of understanding in the field of chemical sciences as it relates to his specialty.

3- Developing and raising the students cognitive abilities

Skills

1. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries.
2. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

4. Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
5. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
6. Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
7. Students will be able to function as a member of an interdisciplinary problem solving team.

Ethics

1. Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

1- Theoretical lectures

2- Short exam (quiz) after each lecture

3- Conducting scientific discussions

4- Conducting various theoretical researches (short report) during the semester

5- Trying to deal with the scientific material in a way that makes the student highly focused through questions and knowledge exchange between students

10. Evaluation methods

1-Daily (Quiz) and monthly tests
2-Scientific research
3-Conducting discussion sessions for students to determine the extent of their understanding of Subject
4-Conducting two to three exam during the semester and one final exam at the end semester.

Professional Development

Mentoring new faculty members

1- One-on-one mentorship with an advanced faculty mentor. The head of the department assigned new faculty a mentor based on research interests.

2- One-on-one mentorship with a near-peer mentor. The head of department assigned a mentor who is in more of a peer position.
3- Group Mentorship Models. The college also assigned multiple mentors how can remove some of the pressure from the mentor-mentee relationship.

Professional development of faculty members

Working to find development ideas and working to develop scientific courses and laboratories and the practical aspect, for staff members

11. Acceptance Criterion

Admission is central (ministerial) and depends on the students' average and the college's acceptance rate in that year, as our department occupies second place in college admissions, as newly accepted students undergo an oral interview to indicate the extent of their desire to join our department in order to organize statistics for the department.

12. The most important sources of information about the program

1- Methodological books approved by the scientific committee in the department and the committees of the colleges of science.
2- staff lectures
3. Books and enrichment sources/sources in English.
4. Internet websites.

13. Program Development Plan

Searching for modern sources from approved websites, as well as diversity in lecturing methods and using all modern methods used in teaching.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
3rd year	MU010303501	Inorganic chemistry V	Basic	√	√	√	√	√	√	√	√				
	MU010303502	Kinetic chemistry	Basic	√	√	√	√	√	√	√	√				
	MU010303503	Organic chemistry III	Basic	√	√	√	√	√	√	√	√				
	MU010303504	Biochemistry 1	Basic	√	√	√	√	√	√	√	√				
	MU010303505	Principles of Industrial chem.	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010303506	Research methodology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010303601	Inorganic chemistry VI	Basic	√	√	√	√	√	√	√	√				
	MU010303602	Electric chemistry	Basic	√	√	√	√	√	√	√	√				
	MU010303603	Organic chemistry IV	Basic	√	√	√	√	√	√	√	√				
	MU010303604	Biochemistry II	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	MU010303605	Application of Industrial chem	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU01	English	Basic	√	√	√	√	√	√	√	√	√	√	√	√
4th year	MU010304701	Instrumental analysis I	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304702	Identification of Organic ch.1	Basic	√	√	√	√	√	√	√	√				
	MU010304703	Biochemistry III	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304704	Polymer chemistry	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304705	Quantum chemistry	Basic	√	√	√	√	√	√	√	√				
	MU010304706	Research project	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304707	Instrumental analysis I	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304801	Instrumental analysis II	Basic	√	√	√	√	√	√	√	√				
	MU010304802	Identification of Organic ch.2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304803	Biochemistry IV	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MU010304804	Pertro chemistry	Basic	√	√	√	√	√	√	√	√	√			
	MU010304805	Spectroscopy chemistry	Basic	√	√	√	√	√	√	√	√	√			

	MU010304806	selective I	Basic	√	√	√	√	√	√	√	√				

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

Course Description of
Year III

1. Course Name:
Inorganic Chemistry V
2. Course Code:
MU010303501
3. Semester / Year:
Semester I (2024-2025)
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
49 hr (Lectures) + 45 hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Dr. MAHMOUD NAJIM ABID: mahmoud_inor71@uomustansiriyah.edu.iq Dr. Ahmed Jasim Al-karawi: ahmedalkarawi@uomustansiriyah.edu.iq

8. Course Objectives	
Course Objectives	1. Understand the fundamental principles of Coordination chemistry including physical and chemical; properties of transition elements, ligands types… etc. 2. Learn about the various isomers of inorganic complexes 3. Understand the coordination numbers of metal complexes especially the well-known C.N like 4,5 and 6 for octahedral , tetrahedral and square-planner geoemtry 4. Understanding the stability of metal complexes according to effective atomic numbers, EAN 5. Learninig the nomenclature IUPAC of coordination and Inorganic complexes 6. Studying the periodic properties of d-block elements like ionic radia, ionization potential and electronegativity, etc…. 7. Introduction to theory bonding like Werner, chain theory and valence bond theory and explore the the structural bonding via magnetic properties, and disadvantages of VBT.

9. Teaching and Learning Strategies	
Strategy	Inorganic Chemistry (V) is fundamental and basic course used in chemistry to learn the physical and chemical properties of transition elements, their metal complexes and predict their stability. Also the course of Inorganic chemistry (V) encourages students to draw the chemical structures of complexes in all coordination numbers with their isomers: geometrical and optical isomers. -Encourage students in practical section to detect the types of metals, cations and their isomers -Incorporating studying in experimental part for students through preparation methods for complexes from starting materials like salts and other compounds.etc…

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	5	- A comprehensive review for electronic configuration of (n-1)d block and studying their physical properties	Transition elements	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
2	5	Classification of ligands: Mono dental, bi dentate and poly dentate chelates	Lewis theory: Ligands and metal ions	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
3	5	IUPAC names of coordination and inorganic complexes: mono and bridge metal complexes	Basic of coordination chemistry	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
4	5	Nomenclatures of metal complexes: coordination, ionic and structural isomers	IUPAC names of inorganic complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
5	5	Coordination numbers: CN.-2, 3, 4, 5 and 6	Geometry of complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
6	5	Isomers of coordination compounds	Stereochemistry of complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
7	5	Optical isomers, coordination isomers, hydration isomers, linkage and ionic isomers	Stereochemistry of complexes and identification	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
8	5	Effective Atomic Number (18 e's rule)	Electronic stability of complexes and metal carbonyls	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
9	5	Magnetic properties of inorganic and coordination compounds: paramagnetic , Ferromagnetic and diamagnetic compounds	Identification of metal complexes by xg values	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
10	5	Blomstrand and Jorgenson chain theory and Werner: Chemical bonding in coordination compounds	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
11	5	Valence Bond Theory: VBT for octahedral, tetrahedral and square-planner complexes	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
12	5	Limitations of VBT	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
13	5	Principles of separation, types, applications	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
14	5	Preparatory week before the final exam	key concepts	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
15		Midterm exam	Exam		

11. Course Evaluation

Theory (quizzes + assessments + activities + reports + exams) = 25%
Laboratory classes = 15%
Final exam = 60%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Inorganic Chemistry, 4tEdition, Atkins Shriver, Wiley; 2004. 2. Inorganic Chemistry: Structure and Bonding, James Huhhey, 3rd Edition, Wiley Science, 2006
Recommended books and references (scientific journals, reports...)	Inorganic Chemistry, 3rd Edition, Gary Miessler, 2006.
Electronic References, Websites	

13. The most important sources of information about the program
Modern Techniques in Coordination Chemistry: Transition elements, coordination numbers and isomers of complexes. Wiley; 2018.

14. Program Development Plan
Developing the methods for preparation of metal complexes and detection methods in laboratory by simple reactions beside the studying their physical and chemical structures by magnetic susceptibility method.

1. Course Name:	
Kinetic Chemistry	
2. Course Code:	
MU010303502	
3. Semester / Year:	
Semester I / 2024-2025	
4. Description Preparation Date:	
19/5/2025	
5. Available Attendance Forms:	
Weekly Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
48 hr (Lectures)	
7. Course administrator's name (mention all, if more than one name)	
Assistant prof. Reem A. Al-Bayati Lecturer Dr. Dina abdulkareem Ali dinaabdaly@uomustansiriyah.edu.iq	
8. Course Objectives	
Course Objectives	**-This course aims to introduce the principles of chemical kinetics, the study of reaction rates,by showing how the rates of reactions may be measured and interpreted.**
9. Teaching and Learning Strategies	
Strategy	At the end of the course, students are expected to learn: • Conduct quantitative analyses of kinetic data • Relate such analyses to underlying mechanisms of chemical reactions

	• Explain on a molecular level the origin of observed kinetics for simple chemical reactions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Empirical chemical kinetics, Rates of reactions	Chemical kinetics, rate of chemical reactions Rate constant	theoretical	Questions and discussion
2	3	Rate laws and rate constants , Molcularity and Order of a Reactions	, molecularity of a reactions	theoretical	Questions and discussion
3	3	Orders of reactions	. first order of reaction Second , third order of reaction and Pseudo-order reactions	theoretical	Questions and discussion
4	3	How to determine the order of a reaction	Differential method, integration Rate law and Half-life of reaction	theoretical	Quizzes, assessments, exams, reports
5	5	The kinetics of Complex reactions :types of complex reaction	types of chemical reactions: Parallel reactions , fast reaction	theoretical	Quizzes, assessments, exams, reports
6	5	mechanism of complex Reactions and Chain reactions	Rate determining step method , steady state approximation	theoretical	Quizzes, assessments, exams, reports
7	3	Practice problems and the First Midterm exam	Practice problems and the First Exam	theoretical	Questions and discussion
8	3	Factors effecting the chemical reaction	Factors effecting the rate of reaction	theoretical	Questions and discussion

9	3	Collision theory	Thermodynamic expression of the rate of reaction	theoretical	Quizzes, assessments, exams, reports
10	3	Arrhenious equation and Practice problems	Molecular kinetic theory of gases	theoretical	Quizzes, assessments, exams, reports
11	3	activated complex theory	Molecular reaction dynamics	theoretical	Quizzes, assessments, exams, reports
12	3	Thermodynamic expression of the rate of reaction	Collision number z1 , Collision number z2	theoretical	Questions and discussion
13	3	Molecular Motion of gases	Mean free path , collision diameter	theoretical	Questions and discussion
14	3	Rate of effusion, Transport proparities motion	Diffusion of gases , effusion wall collision	theoretical	Questions and discussion
15	2	Midterm exam	Midterm exam		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1- Farrington Daniels and Robert A. Alberty , Physical chemistry, John Wiley and Sons, Inc., New York) 2002. 2- ArunBahl, B.S. Bahl and G.D, "Essential of Physical Chemistry", S. chand , 20091988

	4- اساسيات الكيمياء الفيزيائية للمولفون ليلى محمد نجيب ومحمود شاك
Recommended books and references (scientific journals, reports…)	- Principles Modren chemistry , 6th Edition by W. Davia
Electronic References, Websites	https://www.scribd.com/document/731331818/Download-pdf-Principles-Of-Modern-Chemistry-David-W-Oxtoby-ebook-full-chapter

1.**Course Name:**	
Organic Chemistry III	
2. **Course Code:**	
MU010303503	
3. Semester / Year: 1st semester	
Semester I and II / 2024-2025	
4. Description Preparation Date:	
20/5/2025	
5. Available Attendance Forms:	
Weekly Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
34 hr (Lectures) + 45 hr (Laboratory classes)	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Nabel Bunyan Ayrim Saeed **Email:nabelbunyan@uomustansiriyah.edu.iq**	
8. Course Objectives	
Course Objectives	• Understand the basic principles of the meaning of organic compounds. • Naming organic compounds and methods for preparing them in the laboratory. • Identify physical properties, • chemical reactions, and • reaction mechanics.
9. **Teaching and Learning Strategies**	
Strategy	1-Recognizing the importance of the presence of carbonyl groups, amine groups, and geometric shapes in organic compounds. 2- Identify the physical and chemical properties, the scale of acidity and basicity, and the groups affecting them for carboxylic acids and amines.

	3-Study of the stereoscopic shape of organic compounds and their optical activity

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2Theoretical 3 Lab.	Types of carbonyl compounds	Introduction to carbonyl compounds	Lecture Lab	Quiz
2	2Theoretical 3 Lab.	Active group of Carboxylic acid and solubility	Nomenclature and Physical properties of carboxylic acids	Lecture Lab	Quiz
3	2 Theoretical 3 Lab.	Alkylation of alkyl benzene Carbonation of Gainard r Eaction, hydrolysis of nitrile	Preparation of carboxylic acids	Lecture Lab	Quiz
4	2 Theoretical 3 Lab.	Salt formation, ester, amide, anhydride formation, alpha halogen, Nitration	Carboxylic acid reactions	Lecture Lab	Quiz
5	2 Theoretical 3 Lab .	Types of active group of Acid chloride, Anhydride, Ester, Amide, Solubility	Nomenclature and physical properties of carboxylic acid derivatives	Lecture Lab	Quiz
6	2 Theoretical 3 Lab.	From acids, hydrolysis of Acid chloride, amide, anhydride, esters at acid And base medium	Preparation and reactions of carboxylic acid derivatives	Lecture Lab	Quiz
7	2 Theoretical 3 Lab.	Active group of amines and solubility	Nomenclature and physical properties of amines	Lecture Lab	Quiz
8	2 Theoretical 3 Lab.	Reduction of nitro, halides with ammonia or amines, nitriles, and Hofmann degradation	Preparation of amines	Lecture Lab	Quiz
9	2 Theoretical 3 Lab.	Salt formation, Alkylation, conversion into amides, ring substitution in aromatic amines	Amine reactions	Lecture Lab	Quiz

10	2 Theoretical 3 Lab.	Replacement of Nitrogen by another group Cl, Br, CN, I, H, F, OH, Coupling w b	Diazonium salt Reactions	Lecture Lab	Quiz
11	2 Theoretical 3 Lab.	Chiral and Achiral molecules	Introduction to Stereochemistry	Lecture Lab	Quiz
12	2 Theoretical 3 Lab.	Cahan-Ingold-Prelog System, Sequence rule,	Determination of the R, S system, racemic mixture compounds, and meso compounds	Lecture Lab	Quiz
13	2 Theoretical 3 Lab.	Chemical properties, Physical properties, Polar meter, specific rotation	Optical activity, Enantiomers, Diastereomers isomers	Lecture Lab	Quiz
14	2 Theoretical 3 Lab.	Review of key concepts	Revision and Assignments	Lecture Lab	Quiz
15	2	Midterm exam	Midterm exam		test

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Organic Chemistry" by Morrison and Boyd, 6th Edition, 2002
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

13. The most important sources of information about the program

Organic Chemistry" by Morrison and Boyd, 6th Edition, 2002

14. Program Development Plan

Using modern scientific concepts through articles, scientific research, and modern devices, and informing students about them through conducting scientific experiments or through theoretical study.

1. Course Name:	
Biochemistry I	
2. Course Code:	
MU010303504	
3. Semester / Year:	
Semester I / 2024-2025	
4. Description Preparation Date:	
20/5/2025	
5. Available Attendance Forms:	
Weekly Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
49 hr (Lectures) + 45 hr (Laboratory classes)	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Hassanain Kamil dr.hassanain@uomustansiriyah.edu.iq **Dr.Falah Sumoom**	
8. Course Objectives	
Course Objectives	Understanding the basic concepts of biochemistry Understanding carbohydrates, their types, propertiesand importance Understanding lipids, their classification, propertiesand importance Understanding nucleotides and nucleic acids and their functions.
9. Teaching and Learning Strategies	
Strategy	Biochemistry plays a crucial role in various aspects of life, encompassing several essenti concepts that students should understand during their studies

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Structure of water molecule and its role as a solvent	Water molecule	Lectures, Laboratory classes	Questions and discussion
2	5	Monosaccharides	carbohydrates	Lectures, Laboratory classes	Questions and discussion
3	5	Monosaccharides	carbohydrates	Lectures, Laboratory classes	Questions and discussion
4	5	Disaccharides and oligosaccharides	Carbohydrates	Lectures, Laboratory classes	Quiz
5	5	Polysaccharides	carbohydrates	Lectures, Laboratory classes	Questions and discussion

6	5	Classification and properties of lipids	Lipids	Lectures, Laboratory classes	Questions and discussion
7	5	Fatty acids	Lipids	Lectures, Laboratory classes	Questions and discussion
8		Exam			
9	5	Glycerides and waxes	Lipids	Lectures, Laboratory classes	Questions and discussion
10	5	Phospholipids and sphingolipids	Lipids	Lectures, Laboratory classes	Questions and discussion
11	5	Steroids and prostaglandins	Lipids	Lectures, Laboratory classes	Questions and discussion
12	5	Classification and structure of nucleotides	Nucleic acids	Lectures, Laboratory classes	Questions and discussion
13	5	DNA structure and function	Nucleic acids	Lectures, Laboratory classes	Questions and discussion
14	5	RNA structure and function	Nucleic acids	Lectures, Laboratory classes	Questions and discussion
15		Exam			

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	General, Organic, and Biochemistry Lippincott Illustrated Reviews in Biochemistry
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

1. Course Name:
Industrial Chemistry
2. Course Code:
MU010303505
3. Semester / Year:
Semester I and II / 2024-2025
4. Description Preparation Date:
20/5/2025
5. Available Attendance Forms://
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
24 h(Theoretical) / 48 Units
7. Course administrator's name (mention all, if more than one name)
Name: Amani Ayad Husain Email:amaniayad@uomustansiryah.edu.iq
8. Course Objectives
The course aims to enable the student to understand the various chemical reactions that occur in industrial processes cover most organic and inorganic reactions, and everything related to industrial chemistry, including raw materials and industrial methods, manufactures and learn about the most important common industries and technologies they cover

9. Teaching and Learning Strategies	
Strategy	• Using modern teaching methods. • Explaining the course in a lecture manner, with an explanation and clarification of some basic concepts • Use PowerPoint presentations • Use the Internet to view the latest information regarding the course • Asking students questions and conducting some quick tests

10- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction to industrial chemistry	Introduction	Lectures	Ask some questions
2	4	Chemical reactors	Chemical reactors and their types for what purposes they are used	Lectures	Ask some questions, discussion
3	4	Recycling	Recycling, its importance, and methods of recycling materials	Lectures	Quiz
4	4	Detergents	Detergents and their types	Lectures	Class discussion

5	4	Detergents	Detergent manufacturing methods	Lectures	Quiz
6	4	Paints	Coating materials and additives used to improve paint types and descriptions of the ideal coating	Lectures	Class discussion
7	4	Chemistry of cement	Identify the types of cement used in industry and its basic components	Lectures	Class discussion
8	2	Test 1			
9	4	ChemicalCorrosion	Chemical corrosion, the damage resulting from it, and how it occurs	Lectures	Quiz
10	4	Chemical Corrosion	Chemical corrosion, treatment methods according to the causes	Lectures	Class discussion
11	4	Water treatment	Water treatment and causes of water hardness	Lectures	Class discussion
12	4	Water treatment	Testing methods used to determine the purity of water and pollutants and eliminate them	Lectures	Class discussion
13	4	Fertilizers	Fertilizers, manufacturing methods, and commercial production of urea	Lectures	Class discussion
14	4	Fertilizers	Fertilizers, manufacturing methods, and commercial production of urea	Lectures	Quiz
15	2	Test	Midterm test		

11. Course Evaluation
Theory (quizzes + assessments + activities + reports + exams) = 30% Final exam = 70%

12. Learning and Teaching Resources	
Required textbooks (Curricular books, if any)	
Main references (sources)	Industrial Chemistry: Dr. Gorgeas Abd Aladem
Recommended books and references (scientific journals, reports...)	اساسيات الكيمياء الصناعية, د.عزيز احمد امين 2-الكيمياء الصناعية.تكنولوجيا الصناعات الكيميائية ,د.طارق اسماعيل كاخيا
Electronic References, Websites	https://books.google.iq/books?hl=ar&lr=&id=Q6XFfg8IIuAC&oi=fnd&pg=PA3&dq=industrial+chemistry+pdf++&ots=AeNNaaolMY&sig=vhreaqts0seve22SdlPbCr_s5Gw&redir_esc=y#v=onepage&q&f=false https://tech.chemistrydocs.com/Books/Applied%20-%20Industrial/Fundamentals-of-Industrial-Chemistry-Pharmaceuticals,-Polymers,-and-Business-by-John-A.-Tyrell.pdf

13.The most important sources of information about the program
Industrial Chemistry: Dr. Gorgeas Abd Aladem
14.Program Development Plan
Using modern methods in teaching and preparing a student with the ability to understand and analyze basic principles

1. Course Name:
Inorganic Chemistry VI
2. Course Code:
MU010303601
3. Semester / Year:
Semester I (2024-2025)
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
49 r (Lectures) + 45 hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Dr. MAHMOUD NAJIM ABID: mahmoud_inor71@uomustansiriyah.edu.iq Dr. Ahmed Jasim Al-karawi: ahmedalkarawi@uomustansiriyah.edu.iq

8. Course Objectives	
Course Objectives	1. Understand the electronic structures of transition metal complexes via the theories of bonding: Crystal field theory, LFT and MOT. 2. Interpretation the spectra of inorganic and coordination compounds through the complementary colors , UV-Visible-NIR spectra 3. Understanding the electronic spectra of inorganic and coordination compounds in the region (200-750) nm. 4. Understanding the kinetic of transition metal complexes in aqueous solutions depending of their CFSE and ionic charge and other factors. 5. Learning calculation of bond order (metal-ligand) through diagrams of MOT model 6. Learning the trans-effect in square-planner complexes like platinum and palladium (II) ions due to their extensive activities in treatment of cancer and other diseases. 7. Expecting the stability of complexes: inert and labile ions in aqeous solutions and studying the preparation geometrical isomers of square-planner complexes, 8. Learn the estimation gap energies in octahedral and tetrahedral complexes from UV-Visible-NIR absorptions and Orgel diagrams.

9. Teaching and Learning Strategies	
Strategy	Inorganic Chemistry (VI) is very important course in coordination chemistry to learn the chemical and electronic structures of of transition elements, their metal complexes and predict their kinetic and thermodynamic stability. Also the course of Inorganic chemistry (VI) encourages students to estimate and predict the bond-order in metal complexes via CFT and MOT theories. Also, this course encourages students to understand the step-wise reactions of Pt(II) and Pd(II) complexes having cis and trans isomers. -Encourage students in practical part to detect and characterize the bonding in organic-inorganic frame types especially the assignment of absorptions and determine the suggested geometry of the prepared complexes, tetrahedral, octahedral, etc..

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	- Itroduction to the theories of binding	Chemical Bonding in Inorganic Compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
2	5	Crystal field theory: Octahedral and tetrahedral CFT diagrams , CFSE, 10Dq calculations	Chemical Bonding in Inorganic Compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
3	5	Jahn-Teller theorem in Cu(II),Ti(III) complexes, CFT diagram of square-planner complexes, Factors	Crystal Field Theory, Tetragonal Distortion in octahedral complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports

		affecting of 10Dq with examples.			
4	5	Molecular Orbital Theory: Experimental evidences of MOT, MOT diagrams of sigma ML6 and ML4 complexes	Molecular Orbital Theory	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
5	5	Π-Acceptor and Π- Donors Ligands: NO2-,CN-,dipyridine,CO,NO^+ ,RO^- and F^- species	Pi Bonding in ML6	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
6	5	Electronic Spectra of Inorganic and Coordination Compounds: Complementary Colors, Ground Term symbols	UV-Visible-NIR spectroscopy	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
7	5	Types of Electronic spectra in d-block complexes: d-d spectra, Charge transfer absorptions, and Counter ion spectra with examples and Selection Rules, spin-selection and Laporte Rules	Electronic spectra and Selection Rules	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
8	5	Kinetic of metal complexes reactions in aqueous solutions: Associative and Dissociative Mechanism, Inter-system Mechanism, Kinetic stability, Inert and Labile Complexes	Kinetic Stability of Metal Complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
9	5	Magnetic properties of inorganic and coordination compounds: paramagnetic , Ferromagnetic and diamagnetic compounds	Thermodynamic Stability of Coordination Complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
10	5	Thermodynamic Stability of metal complexes: Irving-Williamson series, effect of metal charge, Chelate effect and Steric effect	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
11	5	Trans-effect in square-planner complexes: Geometrical isomers preparation in Pt(II), Pd(II) and Au(III) complexes,	Trans-effect in square-Planner complexes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports

		Trans-effect series of pi bonding ligands			
12	5	Review in UV-Visible-NIR and Kinetic and thermodynamic stability of d-block complexes	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
13	5	Handout and homeworks in comprehensive optional objects in MOT,CFSE calculations and colors of complexes	Chemical Structure in inorganic compounds	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
14	5	Preparatory week before the final exam	key concepts	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
15		Midterm exam	Exam		

11. Course Evaluation
Theory (quizzes + assessments + activities + reports + exams) = 25% Laboratory classes = 15% Final exam = 60%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Inorganic Chemistry, 4tEdition, Atkins Shriver, Wiley; 2004. 2. Inorganic Chemistry: Structure and Bonding, James Huhhey, 3rd Edition, Wiley Science, 2006
Recommended books and references (scientific journals, reports...)	Inorganic Chemistry, 2nd,Edition, OXFORD, Gary Miess 2006.
Electronic References, Websites	

13. The most important sources of information about the program
Modern Techniques in Colors of Coordination Chemistry: Transition elements, coordination numbers and isomers of complexes. Wiley; 2020.

14. Program Development Plan
Developing the methods for dection and characterization metal complexes via UV-Visible-NIR techniques. As well as, learning the easy steps for preparation cis and trans isomers of square-planner complexes which they are considered so important in the field of biological applications.

Course Description of
Year IV

1. Course Name:
Instrumental Analysis I and II
2. Course Code:
MU010304701
3. Semester / Year: 2nd semester
Semester 2024-2025
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
49 hr (Lectures) + 45 hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Professor Dr. Rulla Sabah Naser **Email:rulla_sabah77@uomustansiriyah.edu.**iq

8. Course Objectives	
Course Objectives	1. Understand the basic principles of electrochemical methods analysis techniques 2. Understand the sample preparation techniques compatible with each technology 3. Understand the basic principles of thermal analysis methods techniques 4. Find out the advantages and limitations of each method 5. Learn how to choose the appropriate technique based on factors such as the analyte of interest, the nature of the sample matrix, etc.

9. Teaching and Learning Strategies	
Strategy	Electrochemistry is the Chemistry that deals with the study of the relationship between electrical energy and chemical changes is a collection of techniques that use electrical stimulation to analyze the chemical reactivity of a sample surface or a solution. Oxidation and reduction reaction rates are controlled and measured by a potentiostat, connected to electrodes submerged in an electrolyte.A thermal method of analysis is a technique in which measure a physical property of a material as we subject it to a change in temperature such as thermal methods: thermogravimetry, differential thermal analysis, and differential scanning calorimetry.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical 3 Lab .	Understand the lecture	Introduction of Electrochemical Methods	Lecture Lab	Quiz
2	2Theoretical 3 Lab .	Understand the lecture	Applications of Standard Electrode Potentials	Lecture Lab	Quiz
3	2Theoretical 3 Lab .	Understand the lecture	Potentiometry	Lecture Lab	Quiz
4	2Theoretical 3 Lab .	Understand the lecture	Voltammetry and Polarography	Lecture Lab	Quiz
5	2Theoretical 3 Lab .	Understand the lecture	Electro deposition &Coulometric Method	Lecture Lab	Quiz
6	2Theoretical 3 Lab .	Understand the lecture	Conductimetry	Lecture Lab	Quiz
7	2 hr	-	Exam	Exam	Exam
8	2Theoretical 3 Lab .	Understand the lecture	Introduction of Thermal Analysis, Applications of thermal analysis	Lecture Lab	Quiz
9	2Theoretical 3 Lab .	Understand the lecture	Thermogravimetric Analysis (TGA)	Lecture Lab	Quiz
10	2Theoretical 3 Lab .	Understand the lecture	Differential Thermal Analysis (DTA)	Lecture Lab	Quiz
11	2Theoretical 3 Lab .	Understand the lecture	Differential Scanning Calorimetry (DSC)	Lecture Lab	Quiz
12	2Theoretical 3 Lab .	Understand the lecture	Derivative Thermogravimetry (DTG	Lecture Lab	Quiz
13	2Theoretical 3 Lab .	Understand the lecture	Review of key concepts	Lecture Lab	Quiz

14	2 hr	-	Midterm exam	-	Midterm exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1- Fundamentals of Analytical Chemistry by Skoog ,2016
Recommended books and references (scientific journals,	2- Instrumental Analytical Chemistry by James W. Robinson , 2021
Electronic References, Websites	

13.The most important sources of information about the program

Fundamentals of Analytical Chemistry by Skoog ,2016

14.Program Development Plan

−Learning about the most important modern technologies in the field of electrochemical and thermal analysis by informing students of the most important modern scientific research and recent studies. Practical experiments inscientific laboratories wereupdated with 3 scientific experiments.

1. Course Name:
Biochemistry III
2. Course Code:
MU010304703
3. Semester / Year:
Semester I/ 2024-2025
4. Description Preparation Date:
21/5/2025
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
34 hr (Lectures) + 45 hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Abdulkadir Mohammed Noori Email:kadirchem@uomustansiriyah.edu.iq,
8. Course Objectives

Course Objectives	Teaching the subject of biochemistry for the Forth stage (Department of Chemistry) aims : 1- Understand the basic concepts of metabolism in living systems 2- To introduce the biochemical pathways in living systems mainly dealing with biomolecules like carbohydrates, lipids. 3- To provide and display the most important foundations necessary to understand the relationship of chemistry to the functions of the body through multiple examples that depend on modern information. It also aims to clarify the chemical reactions and changes that occur within the body cells in normal and pathological conditions. 4- To give students basic concepts of Chemical reactions inside cells and their nature of interdisciplinary importance. 5- To expose students to basic clinical biochemistry practical laboratory to see basic tools used in practical. To acquire confidence, interest, challenge and discipline laboratory behavior in biochemistry practical. 6- The course gives an idea for the maintenance of laboratory and the practices that should be accomplished in a laboratory. The course explains how to deal with biological samples and withdraw blood technique as well how to prepare solutions and reagents, or use commercial kits to measure biomolecules (carbohydrate, lipids). 7- Preparing specialists with a solid foundation in biochemical processes, to develop analytical, technical and critical thinking skills and to make them scientifically literate so as to contribute to the discipline after graduation.

9. Teaching and Learning Strategies	
Strategy	Clarifying the scientific material through approved biochemistry books, creating electronic lectures to clarify the chemical reactions inside the cells of organisms.Motivate students to conduct reports and research regarding the subjects they study, use modern technologies in research, and develop their research skills. Preparing some electronic courses and seminars that have a great role in educating students and constructive discussion between the student and tutor.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	General introduction to metabolism	Source of carbon, Nitrogen & energy, Biological membranes, Transport systems	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
2	4	Understanding Carbohydrate metabolism-1	digestion and absorption, glycolysis pathway	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
3	4	Understanding Carbohydrate metabolism-2	Citric acid cycle, gluconeogenesis	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
4	4	Understanding Carbohydrate metabolism-3	glycogen metabolism	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
5	4	Understanding Carbohydrate metabolism-4	Pentose phosphate pathway, Cori cycle, metabolism of other monosaccharide	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
6	4	Understanding Carbohydrate metabolism-5	Electron transport chain,.	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
7	4	Understanding Carbohydrate metabolism-6	Oxidative phosphorylation, energy calculations	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
8	4	Mid Term Exam		(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports

9	4	Understanding Lipid metabolism	Digestion absorption and transport of lipid, Fatty acid oxidation, Activation of Fatty Acid -Transport of Acyl-CoA into Mitochondria by Carnitine Transport System -β-oxidation, Energy yield from the β-oxidation of fatty acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
10	4	Understanding Lipid metabolism	β-oxidation of a Fatty Acid with an Odd Number of Carbon Atoms -Beta oxidation of unsaturated fatty acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
11	4	Understanding Lipid metabolism	Metabolism of ketone bodies, Ketogenesis, Utilization of Ketone Bodies, Ketoacidosis.	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
12	4	Understanding Lipid metabolism	Catabolism of propionyl-CoA., Synthesis of long chain fatty acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
13	4	Understanding Lipid metabolism	Fatty Acid Synthesis ,Triacyl glycerol metabolism: Synthesis of Triacylglycerol in Adipose Tissue	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
14	4	Understanding Lipid metabolism	Cholesterol metabolism: De Novo Synthesis of Cholesterol, Degradation of Cholesterol.	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
15	4	Understanding Lipid metabolism	Synthesis of other types of lipid metabolism: phospholipids, eicosanoids, etc..	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports

11. Course Evaluation

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

1. Conduct daily and quarterly exams
2. Preparing class and homework assignments
3. Conducting final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Abali EA, et al. "Lippincott's illustrated reviews: Biochemistry". 8th ,Wolters Kluwer Health; 2022. 2- Naik P. "Essentials of Biochemistry", 1st ed. 2012 .
Main references (sources)	1-Nelson D. & Cox M., "Lehninger Principles of Biochemistry", 8th ed., W.H. Freeman and Company, New York. 2021.
Recommended books and references (scientific journals, reports...)	1- Rodwell V.W. , Bender D.A., et al "Harper's Illustrated Biochemistry". 32st ed., McGrawHill Companies, New York. 2022.
Electronic References, Websites	Search through the Internet for recent information in the field of metabolism

13.The most important sources of information about the program

1-Abali EA, et al. "Lippincott's illustrated reviews: Biochemistry". 8th ,Wolters Kluwer Health; 2022.
2-Naik P. "Essentials of Biochemistry", 1st ed. 2012 .

Adding and updating programs periodically and adding new information and sources

14.Program Development Plan

According to ministerial orders and instructions, it is necessary to update the curriculum by 20%..

1- Using new sources in the field of biochemistry for the purpose of supplementing lectures

1.Course Name:

Polymers chemistry

2. Course Code:

MU010304704

3. Semester / Year:

Semester I (2024-2025)

4. Description Preparation Date:

19/5/2025

5. Available Attendance Forms:

Weekly attendance

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

34 hr (Lectures) + 36 hr (Laboratory classes)

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

Prof. Dr. Salah Mahdi Al-shukri : salah_m@uomustansiriyah.edu.iq
Lecturer Dr Bashar Hatem Abdbasharalmudares@uomustansiriyah.edu.iq
Lecturer Shorok Sabah shurooqal_khateeb@uomustansiriyah.edu.iq

8. Course Objectives

Course Objectives	• Understanding Polymer Chemistry • Material Design and Development • Characterization Techniques • Applications Across Industries • Polymer Processing • Environmental Impact and Sustainability • Polymer Physics • Advanced Topics and Research

9. Teaching and Learning Strategies

Strategy

1. **Active Learning**: Engage actively with the course material by taking notes, asking questions, and participating in discussions. Actively engaging with the content helps reinforce understanding and retention.

2. **Understand Fundamentals**: Focus on understanding the fundamental principles of polymer chemistry, including polymerization mechanisms, structure-property relationships, and characterization techniques. A strong foundation in these basics is crucial for more advanced topics.

3. **Visual Learning**: Utilize visual aids such as diagrams, charts, and models to understand molecular structures, polymerization processes, and material properties. Visualizing concepts can enhance comprehension and memory retention.

4. **Problem-Solving Practice**: Practice solving problems related to polymer synthesis, structure, and properties. Working through problem sets and case studies helps reinforce theoretical concepts and develop problem-solving skills applicable to real-world scenarios.

5. **Laboratory Work**: Take advantage of laboratory sessions to gain hands-on experience with polymer synthesis, characterization, and processing techniques. Practical experiments provide valuable insights into theoretical concepts and help develop Practical skills.

6. **Group Study**: Form study groups with classmates to discuss concepts, solve problems collaboratively, and share insights. Explaining concepts to others and discussing different perspectives can deepen understanding and clarify difficult topics.

7. **Use Resources**: Make use of textbooks, online resources, academic journals, and supplementary materials to supplement course lectures and readings. Exploring

	additional resources can provide alternative explanations and perspectives on complex topics.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introduction, Definitions, polymer classification and Nomenclature,Types of polymer.	General view	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
2	5	Free radical polymerization	Study of mechanism and kinetics of Free radical polymerization	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
3	5	Ionic Polymerization	Study of mechanism and kineticsIonic Polymerization	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
4	5	Condensation polymerization	Study of mechanism and kinetics Condensation Polymerization	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
5	5	Coordination polymerization	Study of mechanism and kinetics Coordination Polymerization	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
6	5	Co-polymerization	Study the co-polymerization synthesis	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
7	5	Polymerizations processes	Study the concept of polymerization processes	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
8	5	Chemical Reaction of Polymers	Study the types and concept of chemical reaction of polymers	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
9	2	Test			
10	5	Molecular weight of polymers	Study the effect of molecular weight of polymers	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
11	5	Methods for determination of polymer molecular weight	Study the types of method to determine molecular weight of polymers	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
12	5	Thermal Analysis of polymers	Study the thermal analysis of polymers	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
13	5	Mechanical properties of polymers	Study the mechanical properties of polymers	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
14	5	Molecular weight of polymers	Study the application of polymers depend on molecular weight	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
15	2	Test	Midterm test		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1. Principles of Polymer Chemistry" by Paul C. Hiemenz and Timothy P. Lodge. 2. Introduction to Polymers" by Robert J. Young and Peter A. Lovell 3. Polymer Chemistry: An Introduction by Malcolm P. Stevens
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://earthwormexpress.com/wp-content/uploads/2020/07/seymour-carrahers-polymer-chemistry.pdf https://tech.chemistrydocs.com/Books/Applied%20-%20Industrial/Fundamentals-of-Industrial-Chemistry-Pharmaceuticals,-Polymers,-and-Business-by-John-A.-Tyrell.pdf

13.The most important sources of information about the program

Principles of Polymer Chemistry" by Paul C. Hiemenz and Timothy P. Lodge.

14. Program Development Plan

According to ministerial orders and instructions, it is necessary to update the curriculum by 20%.
1- Using new sources in the field of biochemistry for the purpose of supplementing lectures

1. Course Name: Quantum Mechanic
Quantum Mechanic
2. Course Code:
UM010304705
3. Semester / Year:
Semester I / 2024-2025
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly attendance

6. Number of Credit Hours (Total) / Number of Units (Total)
33 hr. theoretical
7. Course administrator's name (mention all, if more than one name)
Name: Assistant .Prof.Dr. Fadhela Muhammad Hussein Email:fadhussein_99@uomustansiriyah.edu.iq Dr .KhalidahHamil : Email:Khalidah.h@uomustansiriyah.edu.iq Assistant Prof.Dr .Mudeer Mubarak : Email:mudeer_sm@yahoo.com Dr.Rasha Wally : Email:rwmal_saedi2@uomustansiriyah.edu.iq

8. Course Objectives	
Course Objectives	1-the student gets to know the basic concepts of quantum mechanic 2-the basic principles use in interpreting chemical reactions, and the calculations used in determining the energy .

9. Teaching and Learning Strategies	
Strategy	1- The student gets to know the basics of quantum chemistry 2- Study quantum mechanics , learn how to understand ,and used the skills to the course are used including development skills : 3- Providing students with the basics and additional topics related to thinking outcomes . 4- Discussing lesson topics that require thinking . 5- Asking a group of intellectual questions during the lecture 6- Give students homework to motivate them to research by solving them. 7- To use the internet to learn about new books and scientific 8- Participation in scientific conferences, seminars inside the country.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to Quantum Mechanics and Coordinates systems	Quantum Mechanics Historical back ground of quantum, Coordinates systems, Cartesian, Spherical, Cylindrical	Explanation and Illustration methods such as display screen	Quiz and exam written
2	2	Introducing the student to Operators	Operators Types of operators (comate, non-comate, Linear, nonlinear) EigenValue Equations—(problem) Variable separation method Classical Mechanics Conservative system	Explanation and Illustration methods such as display screen	Quiz and exam written

3	2	Simple harmonic motion and Lagrangian and Hamiltonian	Newtonian mechanics Simple harmonic motion (problem) Lagrangian and Hamiltonian function The failures of classical physics Black body radiation Heat capacities Photo electronic effect problem Electron diffraction Compton effect	Explanation and Illustration methods such as display screen	Quiz and exam written
4	2	Heisenberg uncertainty principle and Thepostulates of Quantum	Spectral lines of atoms Heisenberg uncertainty principle Simple Harmonic oscillator The postulates of Quantum Mechanics (c- Postulates 1, 2,3 and 4)	Explanation and Illustration methods such as display screen	Quiz and exam written
5	2	Free particle problem	Rotational movement (motion) Particle an sphere Particle an a ring Free particle problem The particle in a one Dimension The particle in three Dimension	Explanation and Illustration methods such as display screen	Quiz and exam written
6	2	Introducing the student to The Rigid Rotator	Degeneracy The Rigid Rotator	Explanation and Illustration methods such as display screen	Quiz and exam written
7	2	Harmonic Oscillator	Harmonic Oscillator and Vibration Motion problem The Hydrogen atom	Explanation and Illustration methods such as display screen	Quiz and exam written
8	2	Approximation methods	Huckel Theory of molecule orbitals An Harmonic Oscillator Approximation methods in quantum mechanic Born –Oppenheimer approximation	Explanation and Illustration methods such as display screen	Quiz and exam written
9	2	Perturbation theory The radial distribution function	The variation method Perturbation theory The radial distribution function Linear combination of Atomic orbitals (LCAO)	Explanation and Illustration methods such as display screen	Quiz and exam written
10	2	MOT and VBT	Molecular orbital theory Valence bond theory Rotational movement	Explanation and Illustration methods such as display screen	Quiz and exam written

11	2	the spectrum types of radiation	Molecular spectrum region of the spectrum types of radiation Emission spectrum	Explanation and Illustration methods such as display screen	Quiz and exam written
12	2	Features of an electronic spectrum	breading of spectrum lines Intensity of spectrum classification of molecules Features of an electronic spectrum	Explanation and Illustration methods such as display screen	Quiz and exam written
13	2	Introducing the student to Infrared spectroscopy Vibration rotation	types of electronic transitions Infrared spectroscopy Vibration rotation spectrum microwave spectroscopy selection rules of electronic transitions	Explanation and Illustration methods such as display screen	Quiz and exam written
14	2		Mid Exam		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Physical chemistry :ATKINS, 2-Quantum chemistry
Main references (sources)	Quantum Chemistry ,Quantum mechanics in chemistry :Melvin W. Hanna
Recommended books and references (scientific journals, reports...)	International Journal of Quantum Chemistry
Electronic References, Websites	

13. The most important sources of information about the program

https://iopenshell.usc.edu/chem599/lectures2017/AThakkar_QChem_Book.pdf

14. Program Development Plan

Using new sources in the field of Quantum mechanics for the purpose of supplementing lectures

1. Course Name:
Biochemistry 4
2. Course Code:
MU10304803
3. Semester / Year:
Semester II / 2024-2025
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms://
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
43 hr (Lectures) + 45 hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Abdulkadir Mohammed Noori Email:kadirchem@uomustansiriyah.edu.iq, kadirchem@yahoo.com

8. Course Objectives	
Course Objectives	**Teaching the subject of biochemistry for the Forth stage (Department of Chemistry) aims :** 1. To introduce the biochemical pathways in living systems mainly dealing with biomolecules like Protein, amino acids, nucleic acids, and nucleotides. 2. To provide and display the most important foundations necessary to understand the relationship of chemistry to the functions of the body through multiple examples that depend on modern information. It also aims to clarify the chemical reactions and changes that occur within the body cells in normal and pathological conditions. 3. To give students basic concepts of Chemical reactions inside cells and their nature of interdisciplinary importance. 4. To expose students to basic clinical biochemistry practical laboratory to see basic tools used in practice. To acquire confidence, interest, challenge, and discipline laboratory behavior in biochemistry practical. 5. The course gives an idea of the maintenance of a laboratory and the practices that should be accomplished in a laboratory. The course explains how to prepare solutions and reagents or use commercial kits to measure biomolecules (saccharide, protein, and nucleic acids). 6. Preparing specialists with a solid foundation in biochemical processes, to develop analytical, technical, and critical thinking skills and to make them scientifically literate so as to contribute to the discipline after graduation.

1. Teaching and Learning Strategies	
Strategy	Clarifying the scientific material through approved biochemistry books, creating electronic lectures to clarify the chemical reactions inside the cells of organisms. Motivate students to conduct reports and research regarding the subjects they study, use modern technologies in research, and develop their research skills. Preparing some electronic courses and seminars

	that have a great role in educating students and constructive discussion between the student and tutor.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	General introduction to metabolismof amino acid and protein	Nitrogen fixation, amino acid pool, protein turnover,	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
2	4	Understanding Metabolism of amino acid and protein	Nitrogen balance, digestion and absorption of amino acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
3	4	Understanding Metabolism of amino acid and protein	Digestion of Dietary Proteins	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
4	4	Understanding Metabolism of amino acid and protein	Glucogenicadketogenic amino acids, synthesis and degradation of amino acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
5	4	Understanding Metabolism of amino acid and protein	Urea cycle	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
6	4	Understanding Metabolism of amino acid and protein	regulation of urea cycle	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
7	4	Understanding Metabolism of amino acid and protein	Metabolism defect of amino acids	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
8	4	Mid Term Exam		(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
9	4	Understanding of Nucleotides metabolism	Nucleotides metabolism, digestion, and absorption	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
10	4	Understanding of Nucleotides metabolism	Synthesis and degradation of purines, diseases associated with purines metabolism	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports

11	4	Understanding of Nucleotides metabolism	Synthesis and degradation of pyrimidines, diseases associated with pyrimidines metabolism	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
12	4	Understanding of Nucleotides metabolism	Genetic expression The central dogma of molecular biology	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
13	4	Understanding of Nucleotides metabolism	DNA Replication and its regulation	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
14	4	Understanding of Nucleotides metabolism	Translation and its regulation	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports
15	4	Understanding of Nucleotides metabolism	Transcription and its regulation	(2 hr. Theoretical + 2 hr. Practical)	Daily exam, quarterly exam, and practical reports

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, dailyoral, monthly, or written exams, reports ....etc
1. Conduct daily and quarterly exams
2. Preparing class and homework assignments
3. Conducting final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Abali EA, et al. "Lippincott's illustrated reviews: Biochemistry". 8th ,Wolters Kluwer Health; 2022. 2-Naik P. "Essentials of Biochemistry", 1st ed. 2012 .
Main references (sources)	1-Nelson D. & Cox M., "Lehninger Principles of Biochemistry", 8th ed., W.H. Freeman and Company, New York. 2021.
Recommended books and references (scientific journals, reports…)	1Rodwell V.W. , Bender D.A., et al "Harper's Illustrated Biochemistry". 32st ed., McGrawHill Companies, New York. 2022.
Electronic References, Websites	Search through the Internet for recent information in the field of metabolism

13. The most important sources of information about the program

1-Abali EA, et al. "Lippincott's illustrated reviews: Biochemistry". 8th ,Wolters Kluwer Health; 2022.
2- Naik P. "Essentials of Biochemistry", 1st ed. 2012 .
3–Adding and updating programs periodically and adding new information and sources

14. Program Development Plan

According to ministerial orders and instructions, it is necessary to update the curriculum by 20%.
1- Using new sources in the field of biochemistry for the purpose of supplementing lectures

1. Course Name:
Petroleum Chemistry
2. Course Code:
MU010304804
3. **Semester** / Year:
Semester II (2024-2025)
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
24hr (Lectures) + 36hr (Laboratory classes)
7. Course administrator's name (mention all, if more than one name)
Assistant Prof Dr. Ali Mohamad Ali Abdul Amir Al-Mokaram ali75@uomustansiriyah.edu.iq **Lecturer: Emad Malak Husein emadmalek@uomustansiriyah.edu.iq**

8. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introduction to crude oil	Overview	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
2	5	Introduction to crude oil theories	Crude oil basics	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
3	5	Crude oil components	A study on the main components of crude oil	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
4	5	Physical and chemical properties of crude oil	It gives an idea about the chemical and physical composition of crude oil	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
5	5	Crude oil evaluation	Study of the most important factors for evaluating crude oil	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
6	5	Petroleum derivatives, their processing and refining methods.	Knowing the most important methods for preparing petroleum derivatives	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
7	5	Petroleum derivatives, their processing and refining methods.	Knowing the most important methods for preparing petroleum derivatives	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
8	5	Test 1		Lectures, Laboratory classes	Quizzes, assessments, exams, reports
9	5	The chemical basis of the most important production processes for petroleum derivatives and ways to improve them	Knowledge of modern methods for the important operations of producing petroleum derivatives and methods of refining them	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
10	5	The chemical basis of the most important production processes for petroleum derivatives and ways to improve them	Knowledge of modern methods for the important operations of producing petroleum derivatives and methods of refining them	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
11	5	Thermal cracking	Knowledge and study of the mechanical thermal cracking of petroleum derivatives and its economic importance	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
12	5	Laboratory tests for petroleum derivatives	Studying the most important laboratory tests for petroleum derivatives	Lectures, Laboratory classes	Quizzes, assessments, exams, reports

13	5	Lubricating oils, methods of preparing them, and improvers added to them	The basic concepts of lubricating oils (fats) and the improvers included in them	Lectures, Laboratory classes	Quizzes, assessments, exams, reports
14	5	Test 2		Lectures, Laboratory classes	Quizzes, assessments, exams, reports
15		a test	Midterm test		

11. Course Objectives	
Course Objectives	1. Understand the basic principles of crude oil 2. An overview of crude oil theories and their basic components. 2. Physical and chemical properties of crude oil 3. Crude oil products, their processing and refining methods. 4. Reviewing the chemical basis of the most important production processes for petroleum derivatives and ways to improve them. 5. Thermal cracking of crude oil 6. Laboratory tests for petroleum derivatives 7. Lubricating oils, methods of preparing them, and improvers added to them

12. Course Evaluation
Theoretical (quizzes + assessments + activities + reports + exams) = 25% Laboratory classes = 15% Final exam = 60%

11. Teaching and Learning Strategies	
Strategy	-The basic principles of oil and gas exploration and production provide a solid and comprehensive foundation in the techniques, concepts, methods, and language used in oil and gas exploration projects. This Theoretical states that oil may be from the remains of some living organisms (animal and plant), especially microscopic marine organisms, that have gathered With the remains of other organisms after their death at the bottoms of the seas and oceans, and mixed with their sand and other mineral deposits, they gradually turned into sedimentary rocks, and their thickness increased. Then they were subjected to enormous pressures, and their temperature rose to very high levels due to the movements of the earth's crust and the effects of the heat of the Earth's interior, so layers were formed. Sedimentary rocks called source rocks, -Crude oil may differ from one place to another in appearance and viscosity, and may differ in its benefit to the consumer. Therefore, studying the physical properties is very important to know the quality of petroleum derivatives, as well as studying the methods of preparing and refining them, and conducting laboratory tests for their production and the benefit from them. -Knowing the important methods for preparing oils (fats) and the enhancers added to them Effective lectures include standards such as: -Encouraging student participation by motivating them to think independently. -Provide real-life examples to attract students' attention and clarify key concepts. - Student participation in our research experiences/student experiences related to petroleum chemistry concepts

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1- Dave, R.R. Khurana, M.L. "Evaluation of Feed stocks for aromatics, olefins and surfactant Plants", Proceeding of National workshop in crude oil evaluation, edited by Nagpal, J.M., Tata Mcgraw Hill Publishing Company Limited, New Delhi 2- Handa, S.K. Feedstock choice in petrochemicals industry" Chemical industry digest august 2010,p.60 3- Mall, I.D., "Petrochemical Process Technology", First Edi., New Delhi, Macmillan India 2007 4- Masood, R. "Role of raw materials in petrochemical industry" Chemical industry news, July 2002,p.13
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

13. The most important sources of information about the program
https://tech.chemistrydocs.com/Books/Applied%20-%20Industrial/Fundamentals-of-Industrial-Chemistry-Pharmaceuticals,-Polymers,-and-Business-by-John-A.-Tyrell.pdf

14. Program Development Plan
Developing teaching methods such as group projects, case studies linked to the objectives of the module.

1. Course Name:
Spectroscopy
2. Course Code:
MU010304805
3. Semester / Year:
Semester II / 2024-2025
4. Description Preparation Date:
19/5/2025
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
33 hr (Lectures)
7. Course administrator's name (mention all, if more than one name)
Name: dr. amjad G., dr. fadhel R. and Mahdi F. Email:mahdi@uomustansiriyah.edu.iq

8. Course Objectives

Course Objectives	Understanding the Theoretical of nuclear magnetic resonance. use of nuclear magnetic resonance spectroscopy in Diagnosis of organic compounds

9. Teaching and Learning Strategies

Strategy	Students rely on themselves to study, and use references from the library using modern teaching methods. Changing the content according to recent scientific findings Adding topics according to the development of science

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Understanding the lecture	Introduction to spectroscopic methods	theoretical	Daily And monthly exams
2	1	Understanding the lecture	Nuclear resonance Theoretical	theoretical	

3	1	Understanding the lecture	Nuclear resonance spectroscopy	theoretical	
4	1	Understanding the lecture	Chemical shift	theoretical	
5	1	Understanding the lecture	Electron and nuclear spin	Theoretical	
6	1	Understanding the lecture	The origin of the nuclear absorption of hydrogen atoms	Theoretical	
7	1	Understanding the lecture	the first exam	Theoretical	
8	1	Understanding the lecture	Factors influencing chemical shift	Theoretical	
9	1	Understanding the lecture	Signal splitting	Theoretical	
10	1	Understanding the lecture	Know the types of signals	Theoretical	
11	1	Understanding the lecture	The area under the peak	Theoretical	
12	1	Understanding the lecture	Solutions to problems	Theoretical	
13	1	Understanding the lecture	Solutions to problems	Theoretical	
14	1	Understanding the lecture	Solutions to problems	Theoretical	
15	1	Understanding the lecture	Second exam	Theoretical	

Course Evaluation

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

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Spectrometric identification of organic compounds / silverstein
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

13.The most important sources of information about the program

1- organic chemistry , graham solomons
2- spectroscopy , lampman, pavia, kriz, Vyvyan

14.Program Development Plan

1- Using new sources in the field of biochemistry for the purpose of supplementing lectures

1. Course Name:	
Radiochemistry	
2. Course Code:	
3. Semester / Year:	
2nd semester /2024-2025	
4. Description Preparation Date:	
19/4/2025	
5. Available Attendance Forms:	
Weekly attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
33 hr theoretical	
7. Course administrator's name (mention all, if more than one name)	
Name: prof. Drtaghreed mohyaldin musa Email:taghreedmohya@yahoo.com	
8. Course Objectives	
Ability to think critically and analytically. Communicate orally and in writing during the lecture The ability to define concepts, basics and principles. Applying knowledge in academic and professional contexts specializing in chemistry The ability to find solutions for various innovative forms of using the Internet in some survey vocabulary devices Applications of radioactive materials, radiation has two common weapons, part of the course content The opinion of department members and their discussion in order to improve job performance. Questionnaire for the faculty member's evaluation of the course: An expert report from a debate college through expert consultation and discussion	What is the primary objective of this course: The student studies the basics of nuclear and radiochemistry, in addition to radioactivity, as well as radioactive decay and nuclear stability, with knowledge of nuclear reactions, radiation measuring devices, radioactive sources, radioactive isotopes, and the various effects of radiation. 2- Briefly describe any plans being implemented to develop and improve the course... • Students rely on themselves to study, and borrow references from the library to learn more. • Using modern teaching methods. • Changing the content according to recent scientific findings.
9. Teaching and Learning Strategies	
Strategy	Students rely on themselves to study, and use references from the library using modern teaching methods. Changing the content according to recent scientific findings Adding topics according to the development of science

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		1. What does an atom consist of Binding energy, nuclear stability, the ratio between neutrons and protons, and nuclear forces? 2. The difference between nuclear, chemical and light reactions	theoretical	Quizzes, assessments, exams, reports
2			adioactive decay by alpha-beta-gamma particles - decay by activation - law of decay - positron decay - electron capture - decay by negatron - unit of radioactivity - the relationship between radioactivity and mass - decay of combined radioactivity (mixed-sequential decay).	theoretical	Quizzes, assessments, exams, reports
3	2		1. Types of radiation: natural radioactive elements and artificial radioactive elements - radioactive isotopes - their definition - types - isotope production. 2. converting mass into energy and exercises	theoretical	Quizzes, assessments, exams, reports
4	2		Fission fragment: its definition, its discovery - the Theoretical of fission fragment - fission products	theoretical	Quizzes, assessments, exams, reports
5	2		Nuclear accelerators: A simplified idea about the use of accelerators and reactors in the production of isotopes	Theoretical	Quizzes, assessments, exams, reports
6	2		Detectors for reading and monitoring radiation: bag and sensitive film ionization chamber - Geiger counter - detectors of solid materials (highly bright detectors - semiconductor detectors proportional counters and crystals used as counters).	Lecture	Quizzes, assessments, exams, reports
7	2		Midterm exam	Test	
11. 8Course Evaluation					
1-Daily (Quiz) and monthly tests (2-3 test during the semester before the final exam. 2-Scientific research 3-Conducting discussion sessions for students to determine the extent of their understanding the subject					
12. Learning and Teaching Resources					

1- Using new concepts and using electronic devices to present information and issues

What does the atom consist of, the binding energy, the stability of the nucleus, the ratio between neutrons and protons, and nuclear forces?

2. The difference between nuclear, chemical and light reactions

3. Radioactive decay with alpha-beta-gamma particles - decay by activation - law of decay - positron decay - electron capture - decay with negatron - unit of radioactivity - the relationship between radioactivity and mass - decay of combined radioactivity (mixed-sequential decay).

4. Types of radiation: naturally radioactive elements and artificially radioactive elements - radioactive isotopes - their definition - types - production of isotopes.

13.The most important sources of information about the program

Required textbooks (curricular books, if any)	Radiochemistry, Dr. Ali Abdel Hussein Saeed, first edition, 1983 AD.
Main references (sources)	1. Foundations of smart chemistry and the phenomenon of radioactivity, Prof. Dr. Ali Abdul Hussein, Soha Abdul Jabbar Al Jassam, first edition 2001-1424 AH. 2. Principles of nuclear chemistry, Prof. Dr. Abdul Hakim TahaQandil, first edition 2001-1424 AH. 3. Foundations of Al-Agaziyya, Dr. Muhammad Farouk Ahmed, Dr. Ahmed Saree, second edition 1419-1998 AD.
Recommended books and references (scientific journals, reports...)	The most important sources of information about the program 1. Radiochemistry, Dr. Majeed Muhammad Al-Qaisi, first edition, 1978 AD. 2. The theoretical foundations of nuclear chemistry, written by Prof. Dr. HadiKazemAwad, Anwar Deeb Mahmoud, and Prof. Dr. Anis Malik Al-Rawi
Electronic References, Websites	

14.Program Development Plan

Using new sources in the field of Radiochemistry for the purpose of supplementing lectures