

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



# **Academic Program and Course Description Guide**

**2024**

## **Introduction:**

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

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

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

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

## **Concepts and terminology:**

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

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

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

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

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

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

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

**Teaching and learning strategies:** They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are

followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

### Academic Program Description Form

University Name: .....

Faculty/Institute: .....

Scientific Department: .....

Academic or Professional Program Name: .....

Final Certificate Name: .....

Academic System: .....

Description Preparation Date:

File Completion Date:

Signature:



Head of Department Name:

Assist. Prof. Wassan Baqir Ali

Date: 20-3-2024

Signature:



Scientific Associate Name:

Prof. Dr. Munther Hamza Radhi

Date: 20-3-2024

The file is checked by: Assist Prof Ghasan Sabeeh Mahmood

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Assist Prof Ghasan Sabeeh Mahmood

Date: 20-3-2024

Signature:



Approval of the Dean

Prof. Dr. Taha Mohammad Hasan

Approval of the Dean

### **1. Program Vision**

The program aspires to prepare a special quality of high-level graduates with an academic background that combines the required basic knowledge and skills that qualifies them to meet the needs of society and graduate a generation of researchers capable of solving its problems in a scientific manner. The department also looks forward to progressing and upgrading a distinguished faculty and striving to have its research included in the lists of internationally prestigious scientific journals. . The department's academic programs must be distinguished and high-quality in both its teaching and research aspects.

### **2. Program Mission**

The program's mission is an Complementary part of the mission of the College of Science, which works hard to benefit from all types of knowledge of science and knowledge to provide society with qualified and efficient scientific cadres in solving the many dilemmas in the fields of industry, agriculture, health, environment, and others, in addition to opening horizons of cooperation with the various service and academic institutions and departments of the state to determine the country's need. Actual research keeping pace with scientific, technical and industrial development at the international level.

### **3. Program Objectives**

- Preparing specialists familiar with the basics of chemistry in theory and practice who are able to fill the need of the labor market, in addition to teaching chemistry to students of other departments in the College of Science and some other colleges at the university.
- Conducting scientific research and trying to keep pace with the scientific development of chemistry.

– Cooperating with state institutions and the private sector by providing advice and scientific advice and conducting chemical analyses.

#### 4. Program Accreditation

No

#### 5. Other external influences

Is there a sponsor for the program?

No

#### 6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	5	13	%8	
College Requirements	6	24	%15	
Department Requirements	24	120	%76	
Summer Training				
Other				

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

## 7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First	Che-1112	Inorganic chemistry 1	4	-
First	Che-1111	Qualitative Analytical Chemistry	3	3
First	Che-1103	Physics	3	3
First	Che-1104	Safety and chemical security	3	-
First	UOD-12012	Arabic Language	3	-
First	UOD-1106	Mathematics I	3	-
First	Che-1217	Volumetric Analytical Chemistry	3	3
First	Che-1218	Inorganic Chemistry 2	4	-
First	UOD- 1105	Human and democracy	3	-
First	Che-12010	Cytology	3	3
First	COS-12011	Computers program	1	3
First	UOD-12012	English Language 2	3	
Second	201CHPC1	Physical Chemistry 1	3	2
Second	202CHOC1	Organic Chemistry 1	3	2
Second	203CHM2	Mathematics2	2	-
Second	204CHC2	Computer2	1	2
Second	205CHIN2	Inorganic chemistry2	3	2
Second	206CHAC2	Analytical chemistry2	2	2
Third	301CHPC2	Physical Chemistry 2	3	2
Third	302CHOC2	Organic Chemistry 2	3	2
Third	303CHIC1	Industrial Chemistry1	2	-
Third	304CHBC1	Biochemistry1	2	2
Third	305CHIC3	Inorganic chemistry3	2	2
Third	306CHEP	Environmental chemistry	2	-
Third	307CHSC	Surface Chemistry	2	-
Furth	401CHGP	Graduate Project	2	6
Furth	402CHQS	Quantum and Spectra	3	-
Furth	403CHIC2	Industrial Chemistry2	2	2
Furth	404CHBC2	Biochemistry2	2	2
Furth	405CHIA	Instrumental Analysis	3	2
Furth	406CHSI	Spectral Identification	1	2
Furth	407CHH	Hormones	2	-
Furth	408CHCOA	Chemistry of the Atmosphere	2	-

## 8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	<ul style="list-style-type: none"><li>- Enabling students to obtain knowledge and understanding of the intellectual framework of chemistry.</li><li>- Enabling students to obtain knowledge and understanding of international chemical standards.</li><li>- Enabling students to obtain knowledge and understanding of the laws of chemistry.</li><li>- Enabling students to obtain knowledge and understanding of chemical analysis standards.</li><li>- Enabling students to obtain knowledge and understanding of the law of misuse of chemicals.</li></ul>
Skills	
Learning Outcomes 2	The solutions to many of the problems that computer scientists solve are not always obvious and instead require these individuals to think outside the box.
Learning Outcomes 3	Collaboration is often necessary in professional settings. Students must learn to work effectively in teams, communicate clearly, resolve conflicts, and assume leadership roles when necessary.
Ethics	
Learning Outcomes 4	Graduates will learn about ethical dilemmas in the field of handling chemical compounds, adhere to professional codes of conduct, and respect the principles of privacy and security.
Learning Outcomes 5	Understand the ethical, social and legal issues related to work in all areas of chemistry and demonstrate ethical behavior and professional responsibility in all aspects of their work

## 9. Teaching and Learning Strategies

Providing students with the basics and topics related to knowledge and systems described in:

A – Clarification and explanation of study materials by the academic staff through the blackboard, smart board, and computer.

B– Providing students with knowledge through homework assignments for academic vocabulary

C– Asking students to visit the library to obtain additional knowledge of academic subjects

D– Improving students’ skills by visiting websites to obtain additional knowledge of academic subjects

## 10. Evaluation methods

Daily and monthly tests with multiple-choice questions for academic subjects

- Grades for sharing difficult competitive questions for students
- Assigning grades to assigned homework
- Student activities

## 11. Faculty

### Faculty Members

Academic Rank	Specialization		Special Requirement s/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
professor	chemistry	Physical chemistry			2	
Assistant Professor	chemistry	Physical chemistry			2	
Assistant Professor	chemistry	Biochemistry			4	
Assistant Professor	chemistry	organic chemistry			3	
Assistant Professor	chemistry	inorganic chemistry			3	
Assistant Professor	chemistry	Industrial chemistry			2	
Assistant Professor	chemistry	analytical chemistry			2	
Lecturer	chemistry	organic chemistry			3	

Lecturer	chemistry	Biochemistry			6	
Lecturer	chemistry	inorganic chemistry			1	
Lecturer	chemistry	Physical chemistry			2	
Lecturer	chemistry	Industrial chemistry			2	
Lecturer	Mathematics	Pure mathematics			1	
assistant Lecturer	chemistry	Lecturer			4	
assistant Lecturer	chemistry	inorganic chemistry			4	
assistant Lecturer	chemistry	Physical chemistry			5	
assistant Lecturer	chemistry	analytical chemistry			5	
assistant Lecturer	chemistry	Biochemistry			2	

### Professional Development

#### Mentoring new faculty members

By participating in training courses, seminars and workshops on modern teaching methods

#### Professional development of faculty members

- Follow up on scientific development by contacting international universities via the Internet
- Participation in scientific conferences inside and outside the country
- Participation in scientific workshops and seminars inside and outside the country
- Field visits in industrial projects.

### 12. Acceptance Criterion

((Central – Scientific)

According to the requirements of the Ministry of Higher Education and Scientific Research, so that it matches the latest admission requirements in Iraqi universities

### 13. The most important sources of information about the program

- Methodological books approved by the sectoral committee for colleges of science.
- The website of the college and university
- Helping books
- Local scientific trends
- Global scientific requirements

### 14. Program Development Plan

Curriculum development: By adding modern topics that keep pace with the continuous development in chemistry. Developing and training faculty members: through their participation in seminars, courses, and attendance at scientific conferences for the purpose of being informed of the latest developments. Laboratory development: In cooperation with the Deanship of the College, work is being done to develop the laboratories of the Chemistry Department

### 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
<b>first</b>	Che-1112	Inorganic chemistry 1	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-1111	Qualitative Analytical Chemistry	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-1103	Physics	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-1104	Safety and chemical security	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	UOD-12012	Arabic Language	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	UOD-1106	Mathematics I	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-1217	Volumetric Analytical Chemistry	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-1218	Inorganic Chemistry 2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	UOD- 1105	Human and democracy	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	Che-12010	Cytology	<b>Basic</b>	√	√	√		√	√	√		√	√	√	

	COS-12011	Computers program	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	UOD-12012	English Language 2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
<b>Second</b>	201CHPC1	Physical Chemistry 1	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	202CHOC1	Organic Chemistry 1	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	203CHM2	Mathematics2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	204CHC2	Computer2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	205CHIN2	Inorganic chemistry2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	206CHAC2	Analytical chemistry2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
<b>Third</b>	301CHPC2	Physical Chemistry 2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	302CHOC2	Organic Chemistry 2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	303CHIC1	Industrial Chemistry1	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	304CHBC1	Biochemistry1	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	305CHIC3	Inorganic chemistry3	<b>Basic</b>	√	√	√		√	√	√		√	√	√	

	306CHEP	Environmental chemistry	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	307CHCC	Clinical chemistry	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
<b>Furth</b>	401CHGP	Graduate Project	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	402CHQS	Quantum and Spectra	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	403CHIC2	Industrial Chemistry2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	404CHBC2	Biochemistry2	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	405CHIA	Instrumental Analysis	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	406CHSI	Spectral Identification	<b>Basic</b>	√	√	√		√	√	√		√	√	√	
	407CHHCC	Heterocyclic Compounds	<b>Basic</b>	√	√	√		√	√	√		√	√	√	

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

## Course Description Form

1. Course Name:	
<b>Qualitative Analytical Chemistry</b>	
2. Course Code:	
<b>Che-1111</b>	
3. Semester / Year:	
<b>Semester one / first stage</b>	
4. Description Preparation Date:	
<b>1/ 9/ 2023</b>	
5. Available Attendance Forms:	
<b>Attendance</b>	
6. Number of Credit Hours (Total) / Number of Units (Total)	
<b>94 hours , 8 ECTS</b>	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Lecturer Ekhlash Ahmed Abdulkareem Email: <a href="mailto:ekhlashmed@uodiyala.edu.iq">ekhlashmed@uodiyala.edu.iq</a>	
8. Course Objectives	
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of chemical equilibrium</li> <li>2. Parameterize solution behavior and calculate solution concentrations given the appropriate equilibrium constants</li> <li>3. Apply knowledge of equilibrium constraints to a range of systems of interest including solubility, acid/base chemistry, complex formation, oxidation/reduction, hydrolysis, and phase partitioning.</li> <li>4. Investigate solution behavior using electrochemical methods, including potentiometry, voltammetry, and ion selective electrodes.</li> </ol>
9. Teaching and Learning Strategies	
<b>Strategy</b>	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

## 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	<p>At the end of this learning unit, the student is able to :</p> <ol style="list-style-type: none"> <li>This course aims to extend the fundamental formation of 'Analytical Chemistry I' to current</li> <li>instrumental analysis methods.</li> <li>The philosophy and strategy of this programme are identical to those described in .</li> <li>This course not only provides excellent practice in analytical techniques, but also allows the rigorous</li> <li>development of experimental schemes and analysis methods, relying on physical chemistry and analytical</li> <li>reasoning.</li> <li>The objectives of the practical exercises are the following :</li> <li>- To help the understanding of the course</li> <li>- To familiarize the students with the theory-experience relationship</li> <li>- To train the students in a professional practice in a chemistry laboratory</li> <li>11- To instil a sense of initiative towards practical processes in the students</li> </ol>	Introduction to analytical chemistry, its types and applications	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	6		Volumetric analysis and its requirements And the types of solutions and their specifications	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	6		Methods of expressing the concentration of solutions The most important laws used	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	6		Solve mathematical examples calculations concentration of different solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	6		Chemical balances and constant balance and how to use it in the chemical balance calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	6		Acids, bases and their types And the presumption and its salts accounts hydrogen concentration	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	6		Types of corrections and how Perform correction calculations How to choose the guides	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			First exam - first semester	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	6		Acid and base bleaching And their types	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	6		Acids and bases corrections power and adjustment accounts and the types of evidence used	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	6		Acids and bases corrections and its types, and how it is performed accounts	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	6		Buffering solutions and their specifications How to prepare and make an account acidity function	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	6		Acidity of solutions and agents affecting them, such as forces ionic and effective coefficient and strong acids and bases	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	6		multiple acids and how Calculating the acidity and how to make corrections	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	6		The most important applications of neutralizers	Board and	- Daily exams

			in the field of environment, industry and biological analyzes And change it	interactive whiteboard	- Homework Monthly exams
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### 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)	Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M. West Eight Edition
Main references (sources)	Analytical Chemistry, Gary Christian Sixth Edition
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

## Course Description Form

13. Course Name:	
<b>Inorganic Chemistry 1</b>	
14. Course Code:	
<b>Che-1112</b>	
15. Semester / Year:	
<b>Semester one / first stage</b>	
16. Description Preparation Date:	
<b>1/ 9/ 2023</b>	
17. Available Attendance Forms:	
<b>Attendance</b>	
18. Number of Credit Hours (Total) / Number of Units (Total)	
<b>150 hours , 6 ECTS</b>	
19. Course administrator's name (mention all, if more than one name)	
Name: Assist. Professor Rawnq Bahman Jimaa Email: <a href="mailto:ranaq@uodiyala.edu.iq">ranaq@uodiyala.edu.iq</a>	
20. Course Objectives	
<b>Course Objectives</b>	Studying the basics of inorganic chemistry and teaching students all the necessary and necessary information related to inorganic chemistry, which qualifies them to work and research in all areas of inorganic chemistry.  Giving an idea about the atomic structure of the elements and explaining the quantum theory, studying some periodic properties of the elements, explaining the nature of ionic and covalent compounds, studying polyatomic particles and the idea of hybridization.
21. Teaching and Learning Strategies	
<b>Strategy</b>	Power point lecture method using data show and whiteboard. Explanation and clarification. Providing students with the basics and additional topics related to the outputs of inorganic chemical thinking and analysis. Forming discussion groups during lectures to discuss inorganic chemistry topics that require thinking and analysis. Asking students a set of thinking questions during the lectures such as what, how, when and why for specific topics. Giving students homework that requires self-explanations in causal ways.

## 22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	<p>A- Cognitive goals</p> <p>1- Enable students to obtain knowledge and understanding of inorganic chemistry.</p> <p>2- Enable students to obtain knowledge and understanding of the chemical elements in the periodic table.</p> <p>3- Enable students to obtain knowledge and understanding of the chemical structures of inorganic compounds.</p> <p>4- Enable students to obtain knowledge and understanding of reactions in inorganic chemistry.</p> <p>5- Enable students to obtain knowledge and understanding of practical experiments in inorganic chemistry.</p> <p>B - The soft skills objectives of the course</p> <p>1 - knowledge skills - remembering.</p> <p>2 - application and analysis skills.</p> <p>3 - Use and development skills.</p> <p>4- evaluation and creativity skills.</p>	Introduction about inorganic chemistry , Atomic structure :Basic structure atom , Rutherford nuclear atom, The origins of radiation, Wave properties of radiation , intra nuclear processes radioactivity.	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	6		Theory of Bohr's model of hydrogen atom : Fall through Bohr theory and hydrogen-like atoms, modification of Bohr's theory (Elliptical Orbit , Zeeman effect, Fine structure).	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	6		De Broglie Waves in the hydrogen Atom , Heisenberg's uncertainty principle , The Schrödinger equation, Quantum numbers.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	6		Examples and solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	6		Atomic orbital's	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	6		Periodic table , Reading the periodic table, Electron configuration :Aufbau principle, Pauli exclusion principle , Hund's rules of maximum multiplicity	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	6		Classification of elements : Based on their general properties , the representative elements.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	6		Atomic Term symbols: Assigning Term symbols , Microstates.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	6		Examples and solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	6		Periodic Trends :Shielding and effective nuclear charge.	Board and interactive	- Daily exams - Homework

			whiteboard	Monthly exams
12	6		Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	6		Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	6		Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	6		Board and interactive whiteboard	- Daily exams - Homework Monthly exams

### 23. Course Evaluation

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

### 24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	الكيمياء اللاعضوية ، تأليف الدكتور ثناء جعفر محمد الحسني ، 1989
Main references (sources)	Inorganic Chemistry principles of structure and reactivity 4th ed, by James E. Huhhey et al, Harper Collins college Puplichers (1993) Inorganic Chemistry, 5th Edition; Gary. L. Miessler and Donald . A. Tarr (2014).
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a>

## Course Description Form

25.	Course Name:
<b>Physics</b>	
26.	Course Code:
<b>Che-1103</b>	
27.	Semester / Year:
<b>Semester one / first stage</b>	
28.	Description Preparation Date:
<b>1/ 9/ 2023</b>	
29. Available Attendance Forms:	
<b>Attendance</b>	
30. Number of Credit Hours (Total) / Number of Units (Total)	
<b>150 hours , 6 ECTS</b>	
31.	Course administrator's name (mention all, if more than one name)
Name:	
32.	Course Objectives
<b>Course Objectives</b>	This course aims to know the most important principles of physics and its laws, supported by the exercises and applications of these principles in life.
33.	Teaching and Learning Strategies
<b>Strategy</b>	<p>Power point lecture method using data show and whiteboard.</p> <p>Explanation and clarification.</p> <p>- Providing students with the basics and additional topics related to thinking outcomes - Forming discussion groups during lectures to discuss physics topics that require thinking and analysis.</p> <p>Asking students a set of thinking questions during lectures, such as what, how, when, and why for specific topics</p> <p>Giving students homework that requires self-explanations in causal ways.</p>

### 34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	1. Describe the major concepts in physics.	Measurement, Dimensions, Units of measurement, Measurement systems, Dimensional analysis	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	6	2. Demonstrate an appropriate level of competency in both computer and research laboratory skills.			
3	6	3. Formulate hypotheses and devise and perform experiments to test a	Vector Addition and Multiplication of Vectors	Board and	- Daily exams - Homework

		hypothesis as individuals and in a team.		interactive whiteboard	Monthly exams
4	6	4. Effectively apply current technology and scientific methodologies for problem solving in various scientific, professional and community settings.	Linear motion in one dimension	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	6		Force and its types and Newton's laws of motion	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	6	5. Effectively use and critically evaluate current technical/scientific research literature, online information, as well as information related to scientific issues in the mass media.	Equilibrium and Work	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	6		Energy and Power	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8		6. Integrate and relate scientific knowledge learned from classroom with real life situations.	Material properties	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	6		Density, Elasticity and Hooke's law	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	6	7. Communicate in written and oral forms with interested citizens and professionals on key concepts in physics and general scientific issues.	Electrostatics, Coulomb's law and Electric field	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	6		Capacitors and Electric current	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	6	9. Maintain life-long learning in the sciences and incorporate new information into the existing body of knowledge.	Resistors and Ohm's	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	6		Electric potential	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	6	10. Outline the applications of physics in industry and the role of physicists as entrepreneurs.	Magnetism and Magnetic field	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	6		Biot-Savart's law and Ampere's	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

### 35. Course Evaluation

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

### 36. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

fluid mechanics fundamental and applications  
Cengel\_Cimbala. Published by McGraw-Hill 2006.

Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, and Wade W. Huebsch, Fundamentals of Fluid Mechanics, John Wiley &

	Sons, 6th ed., 2009.
Recommended books and references (scientific journals, reports...)	Related books and magazines
Electronic References, Websites	Google Scholar, websites and wiki

## Course Description Form

37.	Course Name:
<b>Safety and chemical security</b>	
38.	Course Code:
<b>Cos-1104</b>	
39.	Semester / Year:
<b>Semester one / first stage</b>	
40.	Description Preparation Date:
<b>1/ 9/ 2023</b>	
41. Available Attendance Forms:	
<b>Attendance</b>	
42. Number of Credit Hours (Total) / Number of Units (Total)	
<b>100 hours , 4 ECTS</b>	
43. Course administrator's name (mention all, if more than one name)	
Name: Assist.Prof. Noor Sabah Ahmed Email: <a href="mailto:noorsabah@uodiyala.edu.iq">noorsabah@uodiyala.edu.iq</a>	
44. Course Objectives	
<b>Course Objectives</b>	This subject is an introduction of the basic techniques commonly used in biological and chemical experimental studies, as well as safety issues and practices in biological and chemical laboratories.
45. Teaching and Learning Strategies	
<b>Strategy</b>	<ul style="list-style-type: none"> <li>- Power point lecture method using the data show and the blackboard</li> <li>- Providing students with the basics and additional topics related to chemical safety and security</li> <li>- Forming discussion groups during lectures</li> <li>- Improve and expand their scientific thinking skills. This will be accomplished through interactive classroom and tutorial programs and by looking at types of simple experiments that include some sampling activities of interest to students.</li> <li>- Giving students homework that requires self-explanations in causal ways.</li> </ul>

46. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Upon completion of the subject, students will be able to:	Introduction of Chemical Safety and Security, general Chemistry Safety and Laboratory Rules  Common Laboratory Glassware and Equipment	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>- Monthly exams</li> </ul>
2	3	(a) apply the basic and common techniques used in biological and			

3	3	<p>chemical laboratories;</p> <p>(b) comply with the general laboratory safety, the biological safety and the chemical safety regulations;</p> <p>(c) use laboratory equipment, apparatus, and preparation of reagents and solutions correctly;</p> <p>(d) perform accurate observations in laboratory practices;</p> <p>(e) write the laboratory report in a properly written form with data</p>	General information to laboratory staff ,Chemical storage and how to store chemical.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	3		Acids Bases and Salts	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	3		Lab Safety Symbols and Haz Signs	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3		Principles of Green Chemistr	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3		LABORATORY CHEMICAL WASTE MANAGEMENT	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Lab building requirements	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Rules and precaution need to deal safely with chemicals.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	3		Personal protection equipment, chemicals handing and transf to the department in the safe	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3		Lab accidents and how to deal with, avoiding and protection from fires,	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		chemical waste storage, burning and disposal	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		Selling and purchasing of chemicals, receiving, recording chemical data, delivery to storage,	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	3		safe storage of solvents, flammable and explosive chemicals	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

#### 47. Course Evaluation

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

#### 48. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Estridge, B.H. & Reynolds, A.P. (2012). Basic Clinical Laboratory Techniques. (6th ed.), Thomson Delmar Learning Publishers.
Main references (sources)	Bisen P.S. (2014). Laboratory Protocols in Applied Life Sciences. CRC Press.

	Brown J.K. Biotechnology (2011). A Laboratory Skills Course. (1st ed.), Hercules BioRad Laboratories. Fleming & Hunt (Editors) (2017). Biological Safety Principle and Practices. (5th ed.), ASM Press.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

## Course Description Form

49. Course Name:	
<b>Arabic Language</b>	
50. Course Code:	
<b>UOD-1106</b>	
51. Semester / Year:	
<b>Semester one / first stage</b>	
52. Description Preparation Date:	
<b>1/ 9/ 2023</b>	
53. Available Attendance Forms:	
<b>Attendance</b>	
54. Number of Credit Hours (Total) / Number of Units (Total)	
<b>75 hours , 2 ECTS</b>	
55. Course administrator's name (mention all, if more than one name)	
Name: Assist.Prof. Othman Khlan Farhan Email: <a href="mailto:Othman@uodiyala.edu.iq">Othman @uodiyala.edu.iq</a>	
56. Course Objectives	
<b>Course Objectives</b>	<p>1- Introducing students to the most important basic keys in dealing with an eloquent Arabic language free from any error or melody, and how to learn in terms of literature, grammar, rhetoric, and Arabic dictation, and all of this is for non-specialists.</p> <p>2- Raising students' expressive abilities, increasing their linguistic wealth, and helping them to use the appropriate phrase in a clear and semantic manner.</p> <p>3- Training the students to speak, and the logical organization of ideas, while being careful to adhere to the classical Arabic language.</p> <p>4- Raising students' general linguistic performance.</p> <p>- Enabling students to write, express and speak in an eloquent and clear Arabic language. 5</p> <p>6- Helping students express their ideas through discussion and dialogue in an</p>

	<p>easy and eloquent language.</p> <p>7- Making students able to acquire a linguistic storehouse of eloquent words, expressions and expressions.</p> <p>8- Students learned to preserve the language of the Qur'an, the original Arab heritage.</p>
<b>57. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>-Lecture and participation.</p> <p>-Discussion and dialogue.</p> <p>-Brainstorming.</p> <p>-Writing reports on the subject.</p> <p>--Question and answer.</p>

### 58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	<p>Knowledge and skill goals:</p> <p>1-Knows the methods of the Arabic language.</p> <p>2-Use punctuation tools when writing.</p> <p>3-To be trained on how to analyze literary texts.</p> <p>4-Some examples and exercises express the nominal and verbal sentences.</p>	<p>Explain the importance of the Arabic language and its benefits to the university student.</p> <p>Language, memorizing, interpreting and analyzing the first ten verses of Surat al-Kahf, with an explanation of the virtue of the surah, the reason for its name, and the most important rhetorical and grammatical aspects.</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>- Monthly exams</p>
2	3	<p>5-Discussing some Quranic and literary texts.</p> <p>6-Shows the difference between the original and sub-parse signs.</p>	<p>Language, memorizing, interpreting and analyzing three verses of Surat al-Hujurat, with an explanation of the virtue of the surah, the reason for its name, and the most important rhetorical and grammatical aspects.</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>Monthly exams</p>
3	3	<p>7-Distinguish between verbs and nouns in sentences.</p> <p>8-Practice clear reading and diction.</p>	<p>Literature, memorization and analysis of thirteen lines from the poem Safar Ayoub in the free poetry of the Iraqi poet Badr Shaker al-Sayyab with the life of the poet and the most important</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>Monthly exams</p>

		9-He is trained to write in a good handwriting by defining the types of Arabic calligraphy, writing each letter, then the book of sentences and phrases in the Ruq'a script.	rhetorical and grammatical aspects of the poem.		
4	3		Literature, memorization and analysis of eight verses in enthusiasm of the poet Abi Tayyib al-Mutanabbi with life of the poet with the most important rhetorical and grammatical aspects of the poem.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	3	10-Distinguish between Hamzah al-Qat` and Hamzah al-Wasl when writing.	Arabic grammar and its importance Know the parts of speech (noun, verb and letter) and their most important signs.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3	11-He learns the methods of speaking in front of others with the use of hand, eye and body gestures in proportion to speech.	Arabic grammar: indefiniteness and knowledge types of knowledge (knowledge). Explanation of the topic (the noun of knowledge and the compound noun) with examples.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3	12-Distinguish between the letters Dhaa and Dhaa in writing and pronunciation.	Arabic grammar, (pronouns), explaining the topic (nominative, accusative and prepositional pronouns) with examples.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Language, memorizing, interpreting and analyzing Surat Al-Ala with an explanation of the virtue of the surah, the reason for its name, and the most important rhetorical and grammatical aspects.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Literature, memorizing and analyzing eight verses from the poem (Be Balsamah) by the poet (Elia Abi Madi) with the life of the poet with the most important syntactic and rhetorical cases.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Arabic grammar, explaining the subject of (declarative nouns) with examples and cases of inflection, explaining the subject of (the identifier in addition) with examples and cases of inflection.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

11	3		Arabic grammar, explaining the topic (al-hal), knowing adverb and its owner, and what are the types of adverb with examples and cases of inflection.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3		Spelling in the Arabic language, punctuation marks and their importance in the Arabic language.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		Arabic grammar, explaining the topic (number), knowing the distinction of the number and what are the divisions of the number, with examples and cases of expression.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		Orthography in the Arabic language, the provisions of the hamza (Hamza al-Wasl, Hamza al-Qat', writing the hamza in the middle of the word.)	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	3		Spelling in the Arabic Language: Rulings on Writing Dhaad and Dhaa.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

### 59. Course Evaluation

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

### 60. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ol style="list-style-type: none"> <li>1. The Holy Quran.</li> <li>2. The Book of Rhetoric and Application.</li> <li>3. The Clear Dictation Book.</li> <li>4. The Arabic language curriculum for non-specialists.</li> </ol>
Main references (sources)	<ol style="list-style-type: none"> <li>1. The Book of Explanation of Ibn Aqeel on Al-Fayya Ibn Malik / Ibn Aqeel Abdullah Bin Abdul Rahman.</li> <li>2. The Book of Facilitator in the Arabic Language for Non-Professionals / Dr. Ziyad Tariq Shuli</li> <li>3. The Clear Spelling Book / by Dr. Abbas Hasan.</li> <li>4. Curriculum of the General Arabic Language for Non-Specialists / Abdel Qader Hassan Amin</li> </ol>
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<ol style="list-style-type: none"> <li>1- Al-Mustafa Library <a href="http://www.al-mostafa.com/index.htm">http://www.al-mostafa.com/index.htm</a></li> <li>2- Mishkat Al-Islam Library <a href="http://www.almeshkat.net/books/index.php">http://www.almeshkat.net/books/index.php</a></li> <li>3- Scientific Society for the Arabic Language</li> </ol>

## Course Description Form

61. Course Name:	
<b>Mathematics I</b>	
62. Course Code:	
<b>UoD-1106</b>	
63. Semester / Year:	
<b>Semester one / first stage</b>	
64. Description Preparation Date:	
<b>1/ 9/ 2023</b>	
65. Available Attendance Forms:	
<b>Attendance</b>	
66. Number of Credit Hours (Total) / Number of Units (Total)	
<b>100 hours , 4 ECTS</b>	
67. Course administrator's name (mention all, if more than one name)	
Name: Lecturer. Suhad Kareem Hamid Email: <a href="mailto:suhadkareem@uodiyala.edu.iq">suhadkareem@uodiyala.edu.iq</a>	
68. Course Objectives	
<b>Course Objectives</b>	Teaching the student functions and the concept of continuity for functions and inequalities, as well as derivation, methods of integration and operations on them, and how to use them in various scientific subjects and harness them to solve mathematical problems that they face in various scientific subjects.  Teaching and educating students on all the necessary and necessary information related to mathematics, which qualifies them to model scientific concepts into mathematical equations..
69. Teaching and Learning Strategies	
<b>Strategy</b>	The main strategy that will be : A1- Students' ability to distinguish and cognitive perception (to diagnose general theories and principles in the study) A2-Future planning to link what the student has learned to daily life A 3- Practicing different types of mathematical proofs A 4 - self-reliance in the achievement of mathematics B - The soft skills objectives of the course B1 - skills to apply calculus B2 - skill to find ends

B3 - skill to draw functions

## 70. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	<p>Upon completion of the subject, students will be able to:</p> <p>A- Cognitive goals</p> <p>A1- Enabling students to obtain knowledge and understanding of modern mathematics</p> <p>A2- Enable students to obtain knowledge and understanding of the structure of functions and equations, test their properties, and perform integrations and differentials on them.</p>	<p>Limits and continuity</p> <p>,Estimating limits from graphs, Estimating limits from tables</p> <p>Formal definition of limits (epsilon-delta), Properties of limits, Limits by direct substitution,</p> <p>Limits using algebraic manipulation, Strategy in finding limit</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>- Monthly exams</p>
2	3	<p>A3- Enabling students to obtain knowledge and understanding of mathematical integrations and differentials of functions.</p>	<p>Continuity at a point, Continuity over an interval, Removing discontinuities, Infinite limits ,</p> <p>Limits at infinity, Intermediate value theorem</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>Monthly exams</p>
3	3	<p>A4- Enabling students to obtain knowledge and understanding of numerical analysis methods and types of equations</p> <p>B - The soft skills objectives of the course</p> <p>B1 - the skill of knowing - remembering</p>	<p>Derivatives: definition and basic rules,</p> <p>Estimating derivatives, definition and basic rules</p> <p>Differentiability, definition and basic rules, Power rule, chain rule and other More chain rule practice, chain rule and other advanced topic</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>Monthly exams</p>
4	3	<p>B2 - Memory and analysis skills</p> <p>B3 - Use and modeling skills</p>	<p>Implicit differentiation, Implicit differentiation (advanced examples), Differentiating inverse functions, Derivatives of inverse trigonometric func</p>	Board and interactive whiteboard	<p>- Daily exams</p> <p>- Homework</p> <p>Monthly exams</p>

5	3		Second derivatives, Disguised derivatives, Logarithmic differentiation, exponential differentiation	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3		Applications of derivatives, Approximation with local linearity, Applications of derivatives L'Hôpital's rule, L'Hôpital's rule, composite exponential functions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3		<b>Midterm Exam</b>	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Integrals, Indefinite integrals of common functions, Integrals .Definite integrals of common Integrating with u-substitution,	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Integrating using long division and completing the squares Integrating using trigonometric identities	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Integration of rational function, Integration by parts, Integration by fraction partition	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	3		Sequences, Series and the integral test, Comparison test	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3		Alternating Series, absolute convergence, ratio and root tests	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		Strategy for testing series, Power series, representations of functions as power series	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		Taylor and Maclaurin series	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	3		Applications of Taylor polynomials	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

## 71. 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

## 72. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<i>Foundations of the Calculus</i> , DeBaggis, Henry F.; Miller, Kenneth S. (1966) <i>Differential and Integral Calculus</i> , <a href="#">Philip Franklin</a>
Main references (sources)	Limits and Continuity, <a href="#">Teddy C. J. Leavitt</a>
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<a href="https://www.cuemath.com/calculus/">https://www.cuemath.com/calculus/</a>

## Course Description Form

73.	Course Name:	<b>Volumetric Analytical Chemistry</b>
74.	Course Code:	Che-1217
75.	Semester / Year:	<b>Semester</b>
76.	Description Preparation Date:	<b>1/ 9/ 2023</b>
77.	Available Attendance Forms:	<b>Attendance</b>
78.	Number of Credit Hours (Total) / Number of Units (Total)	<b>175 hours , 8 ECTS</b>
79.	Course administrator's name (mention all, if more than one name)	Name: Assist. Lecturer Ekhlash Ahmed Abdulkareem Email: <a href="mailto:ekhlashmed@uodiyala.edu.iq">ekhlashmed@uodiyala.edu.iq</a>
80.	<b>Course Objectives</b>	
<b>Course Objectives</b>	<p>Throughout this course, we will focus on the following learning objectives:</p> <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of chemical equilibrium</li> <li>2. Parameterize solution behavior and calculate solution concentrations given the appropriate equilibrium constants</li> <li>3. Apply knowledge of equilibrium constraints to a range of systems of interest including solubility, acid/base chemistry, complex formation, oxidation/reduction, hydrolysis, and phase partitioning.</li> <li>4. Investigate solution behavior using electrochemical methods, including potentiometry, voltammetry, and ion selective electrodes.</li> </ol>	
81.	<b>Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>Power point lecture method using data show and whiteboard. Explanation and clarification. Providing students with the basics and additional topics related to the outputs of analytical chemical thinking and analysis. Forming discussion groups during lectures to discuss analytical chemistry topics that require thinking and analysis. Asking students a set of thinking questions during the lectures such as what, how, when and why for specific topics.</p>	

## 82. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	<p>At the end of this learning unit, the student is able to:</p> <p>12. This course aims to extend the fundamental formation of 'Analytical Chemistry I' to current.</p> <p>13. instrumental analysis methods.</p> <p>14. The philosophy and strategy of this program are identical to those described in.</p> <p>15. This course not only provides excellent practice in analytical techniques, but also allows the rigorous.</p> <p>16. development of experimental schemes and analysis methods, relying on physical chemistry and analytical reasoning.</p> <p>17. reasoning.</p> <p>18. The objectives of the practical exercises are the following :</p> <p>19. - To help the understanding of the course</p> <p>20. - To familiarize the students with the theory-experience relationship</p> <p>21. - To train the students in a professional practice in a chemistry laboratory</p> <p>22. - To instil a sense of initiative towards practical processes in the students</p>	Volumetric Analysis, Classification and General Aspect for Volumetric Titrimetric.	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	6		Expressing the concentration of standard solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	6		Volumetric Calculations Using Molraity and calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	6		Volumetric Calculations Using Normality and calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	6		Titer (T) and calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	6		Back-titration and calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	6		Neutralization Titration and classifications	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			first exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	6		Theory of Neutralization Titrations of Simple Systems	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	6		Type of Neutralization Titrations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	6		Titration curves	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	6		Titration Curve for Strong Base vs. Strong Acid with calculations	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	6		Oxidation and reduction and what oxidizing and reducing agents	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	6		Evidence of oxidation and reduction And their types	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

15	6		oxidizing and reducing agents types and applications	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
16	6		Second exam - first semester	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams

### 83. 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

### 84. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M. West Eight Edition
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Analytical Chemistry, Gary Christian Sixth Edition
Electronic References, Websites	<a href="http://www.byto.com">www.byto.com</a>

## Course Description Form

85. Course Name:

**Inorganic Chemistry 2**

86. Course Code:

**Che-1218**

87. Semester / Year:

**Semester**

88. Description Preparation Date:

**1/ 9/ 2023**

89. Available Attendance Forms:

**Attendance**

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

**150 hours , 6 ECTS**

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

Name: Ass.prof. Rawnaq Bahman Jimaa

Email: rawnaq@uodiyala.edu.iq

92. Course Objectives

**Course Objectives**

Studying the basics of inorganic chemistry and teaching students all the necessary and necessary information related to inorganic chemistry, which qualifies them to work and research in all areas of inorganic chemistry. Giving an idea about the atomic structure of the elements and explaining the quantum theory, studying some periodic properties of the elements, explaining the nature of ionic and covalent compounds, studying polyatomic particles and the idea of hybridization.

93. Teaching and Learning Strategies

**Strategy**

Power point lecture method using data show and whiteboard. Explanation and clarification. Providing students with the basics and additional topics related to the outputs of inorganic chemical thinking and analysis. Forming discussion groups during lectures to discuss inorganic chemistry topics that require thinking and analysis. Asking students a set of thinking questions during the lectures such as what, how, when and why for specific topics. Giving students homework that requires self-explanations in causal ways.

## 94. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	<p>A- Cognitive goals</p> <p>1- Enable students to obtain knowledge and understanding of inorganic chemistry.</p> <p>2- Enable students to obtain knowledge and understanding of the chemical elements in the periodic table.</p> <p>3- Enable students to obtain knowledge and understanding of the chemical structures of inorganic compounds.</p> <p>4- Enable students to obtain knowledge and understanding of reactions in inorganic chemistry.</p> <p>5- Enable students to obtain knowledge and understanding of practical experiments in inorganic chemistry.</p> <p>B - The soft skills objectives of the course</p> <p>1 - knowledge skills - remembering.</p> <p>2 - application and analysis skills.</p> <p>3 - Use and development skills.</p> <p>4- evaluation and creativity skills.</p>	Ionic compounds , Lattice energy, Born-Haber Cycle, Polarizations and Covalency.	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	3		Fajan,s Rules in polarization , Hydration of Ions or Solubility of ionic compound.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	3		Structure of metal crystals	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	3		Covalent compounds and bonding theories : Lewis Structures.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	3		Examples and solutions.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3		Assigning Formal Charge on Atoms in compounds, Resonance structure.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3		Valence bond theory (VBT) : Orbital Hybridization	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Examples and solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Valence shell electron pair repulsion (VSEPR) theory	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	3		Examples and solutions.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3		Molecular Orbital Theory (MOT)	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		Hydrogen : The group1 elements : the alkali metals , The group2 elements : the alkaline earth metals	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		Hydrogen : The group13 elements , The group14 elements	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

15	3		Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
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### 95. 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

### 96. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Inorganic Chemistry principles of structure and reactivity 4th ed, by James E. Huhhey et al, Harper Collins college Puplichers (1993)
Recommended books and references (scientific journals, reports...)	Inorganic Chemistry, 5th Edition; Gary. L. Miessler and Donald . A. Tarr (2014).
Electronic References, Websites	<a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a>

## Course Description Form

97. Course Name:	
<b>Human and democracy</b>	
98. Course Code:	
<b>UoD- 1105</b>	
99. Semester / Year:	
<b>Semester</b>	
100. Description Preparation Date:	
<b>1/ 9/ 2023</b>	
101. Available Attendance Forms:	
<b>Attendance</b>	
102. Number of Credit Hours (Total) / Number of Units (Total)	
<b>100 hours , 4 ECTS</b>	
103. Course administrator's name (mention all, if more than one name)	
Name: Othman Khlan Frhan Email: othman@uodiyala.edu.iq	
104. Course Objectives	
<b>Course</b>	1. The course aims to introduce students to human rights, freedom and democracy, its most prominent sources and characteristics, and the historical stages that human rights,

<b>Objectives</b>	<p>freedom and democracy went through.</p> <p>2. Then get acquainted with the Universal Declaration of Human Rights and the most prominent articles included in the Declaration, international treaties and covenants and the most prominent international organizations.</p> <p>3. The most important international conventions in the field of human rights, freedom and democracy, and introducing students to human rights in the monotheistic religions (Christian, Islamic religion) and other religions.</p> <p>4. And then emphasizing democracy and how to practice democracy in a newly democratic society, so that students are the nucleus of the future in building the Iraqi state.</p>
<b>105. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>Methods of teaching and learning</p> <ul style="list-style-type: none"> <li>- The electronic lecture on Google meet using Google Classroom.</li> <li>-Explanation and clarification.</li> <li>- Brainstorming</li> </ul>

106. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	<p>Cognitive goals</p> <p>1- Know human rights, freedom and democracy.</p> <p>2- The student mentions the most important human rights in life.</p> <p>2- The student knows the term human rights, freedom and democracy.</p> <p>3- The student applies the principles of human rights, freedom and democracy within the university campus.</p> <p>4- The student discusses human rights, freedom and democracy and their development through ancient civilizations.</p>	<p>The first topic: definition of human rights</p> <p>Concept of human rights, definition of human rights.- definition of right- definition of human being- definition of concept of human rights). The importance of studying human rights, characteristics of human rights.</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>- Monthly exams</li> </ul>
2	3	<p>5- The student explains the overlap between the democratic system and other systems of government.</p> <p>6- The student distinguishes between guaranteeing human rights under democratic regimes from other regimes.</p>	<p>Generations of human rights (the first generation is the generation of civil and political rights, the second generation is the generation of economic, social and cultural rights, and the third generation is the generation of new rights).</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>
3	3	<p>Skill objectives of the course</p> <p>1 - The student realizes the importance of human rights, freedom and democracy to preserve the dignity of this</p>	<p>The second topic: the historical development of human rights</p> <p>Human rights in the civilizations of Mesopotamia (the law</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>

		<p>person.</p> <p>2 - The student demonstrates his adherence to all principles that protect human rights, freedom and democracy.</p> <p>3 - The student draws models that express the demand for human rights, freedom and democracy.</p> <p>4 - The student uses the theoretically acquired concepts in educating society to preserve human rights, freedom and democracy.</p>	<p>of Urkagina and Urnammu, the law of Ishtar, the law of the kingdom of Eshnunna, the law of Hammurabi's law), human rights in other ancient civilizations (the Indian and Chinese civilization, the civilization of Pharaonic Egypt, the Greek civilization and the Roman civilization).</p>		
4	3		<p>The third topic: Human rights in Islam (the rights of the child, women, social, economic and political rights). Human rights in the Middle Ages, human rights in divine laws, in Judaism and Christianity, human rights at the level of modern revolutions and legitimacy.</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>
5	3		<p>The fourth topic: Recognition of human rights at the international level, stages of international recognition of human rights, contemporary regional recognition.</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>
6	3		<p>The fifth topic: human rights at the European level, the American level, the African level, and the Arab and Islamic level, explaining the paragraphs and articles of the Universal Declaration of Human Rights in 1948.</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>
7	3		<p>The sixth topic: human rights in international and regional conventions and national legislation, including (the Universal Declaration of Human Rights, human rights in the two international covenants).</p>	Board and interactive whiteboard	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>
8			<p>The seventh topic: the emergence of non-governmental</p>	Board and interactive	<ul style="list-style-type: none"> <li>- Daily exams</li> <li>- Homework</li> <li>Monthly exams</li> </ul>

			organizations and their role in the field of human rights (the International Committee of the Red Cross, Amnesty International, Human Rights Watch, Arab Organization for Human Rights Watch).	whiteboard	
9	3		The eighth topic: the definition of democracy, the concept of democracy, the advantages of democracy, the historical development of democracy and freedom in ancient historical times (Mesopotamia civilization, the Nile Valley civilization, the Greek civilization, the Roman civilization)	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		The ninth topic: the stages of the democratic system in Iraq, the most important articles of the Iraqi constitution of 2005 AD in the field of democracy and human rights. The relationship between the general rights and freedoms of individuals and democracy, the difference between freedom evaluates the democratic system and the stages of its implementation in Iraq (pros of democracy, negatives of democracy)	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	3		Topic 10: Types of Democracy (First - Direct Democracy, Second - Indirect Democracy, divided into: A - semi-direct democracy, b - indirect democracy, and its most important advantages and disadvantages (representative democracy (parliamentary), consensual democracy,	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

			delegated democracy).		
12	3		Table Eleven: General conditions for the success of the democratic system (respect for human rights, political pluralism, peaceful transfer of power) (political equality, respect for the principle of democracy, and the existence of the rule of law).	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		The twelfth topic: the components and pillars of democracy (citizenship, political participation, elections, representatives and responsibility) (contestation, constitutional legitimacy, separation of powers, transparency and accountability).	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		The thirteenth topic: the concept of elections and their legal adaptation (election conditions, concepts specific to elections, electoral administration). (General principles of electoral administration, election systems, majority system and proportional representation).	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	3		The fourteenth topic: administrative corruption, its concept and definition, types of corruption, causes of corruption, treatments for corruption, some political terms (constitutional court, presidential system, parliamentary system, federal union, secularism, technocracy, aristocracy, liberalism, bureaucracy, imperialism).	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

107. 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	
<b>108. Learning and Teaching Resources</b>	
Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	
Recommended books and references (scientific journals, reports...)	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.
Electronic References, Websites	<a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a>

## Course Description Form

<b>109. Course Name:</b>	
<b>Cytology</b>	
<b>110. Course Code:</b>	
<b>Che-12010</b>	
<b>111. Semester / Year:</b>	
<b>Semester</b>	
<b>112. Description Preparation Date:</b>	
<b>1/ 9/ 2023</b>	
<b>113. Available Attendance Forms:</b>	
<b>Attendance</b>	
<b>114. Number of Credit Hours (Total) / Number of Units (Total)</b>	
<b>150 hours , 8 ECTS</b>	
<b>115. Course administrator's name (mention all, if more than one name)</b>	
Name: Najwa Jameel Hameed Email: <a href="mailto:dr.najwajameel@uodiyala.edu">dr.najwajameel@uodiyala.edu</a>	
<b>116. Course Objectives</b>	
<b>Course Objectives</b>	Preparing specialists who are familiar with the basics of cytology, theoretically and practically, who are able to meet the needs of the labor market, in addition to teaching cytology to students of other departments in the Faculty of Science and some other faculties at the university. Conducting scientific research and trying to keep pace with the scientific development of cytology. Cooperating with state institutions and the private sector by providing advice and scientific advice and conducting cytology.
<b>117. Teaching and Learning Strategies</b>	

<b>Strategy</b>	Clarification and explanation of the study materials by the academic staff through the blackboard, smart board and computer. Providing students with knowledge through homework assignments for academic vocabulary Asking students to visit the library to obtain additional knowledge of the study materials .Improving students' skills by visiting websites to obtain additional knowledge of the study subjects
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## 118. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	Enable students to gain knowledge and understanding of the intellectual framework of cytology, enable students to acquire knowledge and understanding of international cytology standards, enable students to acquire knowledge and understanding of the laws of cytology ,enable students to acquire knowledge and understanding of cytolog analysis standards, enabling students to obtain knowledge and understanding of the law of the wrong use of cytological . skills goals special to the programme scientific skills , reminding and analyzing skills and uses , development skills .	Biochemistry and cell membranes Application of biochemistry	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	6		Biomolecules, cell membrane and cell wall contents	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	6		Cellular transport across cell membranes , mechanisms of transfer materials through cell membranes	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	6		Active transport, passive transport, carrier proteins	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	6		proteins channels transport , potassium channels , Sodium potassium pump	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	6		Endoplasmic reticulum, Golgi apparatus	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	6		Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Plasma membranes	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	6		Endocytosis , Exocytosis	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	6		Function of water in the body and cell , the solubility of compounds in water, buffer solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	6		Principal of buffering, acidic buffer solutions , adding acid or base to	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

			this buffer		
12	6		Alkaline buffer solutions , adding acid or base to this buffer	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	6		Calculations involving buffer solutions, acidic buffer solutions , alkaline buffer solutions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	6		Blood Buffer	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	6		Exam	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

### 119. 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

### 120. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ol style="list-style-type: none"> <li>1- Essentials of Medical Biochemistry by N.VBhagavan &amp; Chung Eun-Ha</li> <li>2- 2- Lehninger Principles of Biochemistry by DavidL. Nelson &amp; Michael M. Cox</li> </ol>
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

## Course Description Form

121.	Course Name:	<b>Computers program</b>		
122.	Course Code:	<b>COS-12011</b>		
123.	Semester / Year:	<b>Semester</b>		
124.	Description Preparation Date:	<b>1/ 9/ 2023</b>		
125.	Available Attendance Forms:	<b>Attendance</b>		
126.	Number of Credit Hours (Total) / Number of Units (Total)	<b>100 hours , 4 ECTS</b>		
127.	Course administrator's name (mention all, if more than one name)	Name: Qusay Kanaan Kadhim  Email:dr.qusay.kanaan@uodiyala.edu.iq		
128.	Course Objectives	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>Course Objectives</b></td> <td> <ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system.</li> <li>2. To learn generation, classification and application of computers.</li> <li>3. Knowledge of computer equipment, including both hardware and software.</li> <li>4. To learn input devices and output devices in detail</li> <li>5. To learn memory and its types in detail</li> <li>6. Knowledge of number system, number arithmetic, ASCII &amp; EBCDEC character set.</li> <li>7. Knowledge of Software, its types and application package</li> <li>8. Use word-processing software (MS-Word), spreadsheet software (MS-Excel) and presentation software (MS-PowerPoint) to solve basic information systems problems.</li> </ol> </td> </tr> </table>	<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system.</li> <li>2. To learn generation, classification and application of computers.</li> <li>3. Knowledge of computer equipment, including both hardware and software.</li> <li>4. To learn input devices and output devices in detail</li> <li>5. To learn memory and its types in detail</li> <li>6. Knowledge of number system, number arithmetic, ASCII &amp; EBCDEC character set.</li> <li>7. Knowledge of Software, its types and application package</li> <li>8. Use word-processing software (MS-Word), spreadsheet software (MS-Excel) and presentation software (MS-PowerPoint) to solve basic information systems problems.</li> </ol>
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Understand the meaning and basic components of a computer system.</li> <li>2. To learn generation, classification and application of computers.</li> <li>3. Knowledge of computer equipment, including both hardware and software.</li> <li>4. To learn input devices and output devices in detail</li> <li>5. To learn memory and its types in detail</li> <li>6. Knowledge of number system, number arithmetic, ASCII &amp; EBCDEC character set.</li> <li>7. Knowledge of Software, its types and application package</li> <li>8. Use word-processing software (MS-Word), spreadsheet software (MS-Excel) and presentation software (MS-PowerPoint) to solve basic information systems problems.</li> </ol>			
129.	Teaching and Learning Strategies	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>Strategy</b></td> <td> <p><b>In this course, students are guided by:</b></p> <ul style="list-style-type: none"> <li>• Using different examples.</li> <li>• Using different styles of discussion that aim to connect the theoretical and practical sides.</li> <li>• Asking questions and giving exercises that require analysis and conclusions related to lectures.</li> <li>• Encourage students to participate in discussions and do the practical work.</li> </ul> <p>Encourage students to work in groups.</p> </td> </tr> </table>	<b>Strategy</b>	<p><b>In this course, students are guided by:</b></p> <ul style="list-style-type: none"> <li>• Using different examples.</li> <li>• Using different styles of discussion that aim to connect the theoretical and practical sides.</li> <li>• Asking questions and giving exercises that require analysis and conclusions related to lectures.</li> <li>• Encourage students to participate in discussions and do the practical work.</li> </ul> <p>Encourage students to work in groups.</p>
<b>Strategy</b>	<p><b>In this course, students are guided by:</b></p> <ul style="list-style-type: none"> <li>• Using different examples.</li> <li>• Using different styles of discussion that aim to connect the theoretical and practical sides.</li> <li>• Asking questions and giving exercises that require analysis and conclusions related to lectures.</li> <li>• Encourage students to participate in discussions and do the practical work.</li> </ul> <p>Encourage students to work in groups.</p>			

### 130. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	<p>After the completion of the course, Students will be able to</p> <ol style="list-style-type: none"> <li>Understand model, components of computer and how it works.</li> <li>Understand the concept of input and output devices of Computers in detail.</li> <li>Understand RAM, ROM and their types in detail.</li> <li>Understand the concepts, structure, types and design of operating Systems.</li> <li>Recognize when to use each of the Microsoft Office programs to create professional and academic documents.</li> <li>Students will have a working knowledge of paragraph formatting, macro and mailmerge in MS-Word.</li> <li>Students will have a working knowledge of basic functions and formulas in MExcel.</li> <li>Create presentation by adding slides, applying animations, set times to slides, linking to other file.</li> </ol>	Overview of computers and their basic components and applications	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	3		Introduction to windows operations system	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	3		Operation System properties, Difference between OS, program ,software , application	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	3		Network and internet (setting ,www, Email, search Engine)	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
5	3		Microsoft Office Word: Editing a Document and Formatting Text and Paragraphs	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3		Microsoft Office Word: Adding Tables and Inserting Graphic Objects	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3		Microsoft Office Word: Controlling Page Appearance and Proofing a Document	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			Microsoft Office Excel: Getting Started with Excel	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Microsoft Office Excel: Sorting, Selecting and Sub totaling data	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Microsoft Office Excel: Formulas and Functions	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
11	3		Microsoft Office Excel: Worksheet Formatting and Presentation	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3		Microsoft Office Power Point: Getting Started with Power Point	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3		Microsoft Office Power Point: Developing a PowerPoint Presentation, Adding Graphical	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3		Elements to Your Presentation and Modifying Objects in Your Presentation	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
15	3		Microsoft Office Power	Board and	- Daily exams

			Point: Adding Graphical Elements, tables and charts to Your	interactive whiteboard	- Homework Monthly exams
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### 131. 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

### 132. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

Recommended books and references (scientific journals, reports...)

Computer Essentials), F.Y. B.Com.Computer Concepts and Applications (Computer Fundamentals)

Electronic References, Websites

## Course Description Form

133. Course Name:

**English Language**

134. Course Code:

UOD-12012

135. Semester / Year:

**Semester**

136. Description Preparation Date:

**1/ 9/ 2023**

137. Available Attendance Forms:

**Attendance**

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

**75 hours , 2ECTS**

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

Name: Khansaa Yousif Ahmen  
Email:

140. Course Objectives

**Course Objectives**

The module aims to develop the students' English skills in reading, writing, listening and speaking.

141. Teaching and Learning Strategies

<b>Strategy</b>	Headway's trusted methodology combines solid grammar and practice, vocabulary development, and integrated skills with communicative role-plays and personalization. Authentic material from a variety of sources enables students to see new language in context, and a range of comprehension tasks, language and vocabulary exercises, and extension activities practice the four skills. 'Everyday English' and 'Spoken grammar' sections practice real-world speaking skills, and a writing section for each unit at the back of the book provides models for students to analyze and imitate.
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## 142. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. Read and understand simple texts in English. 2. Answer simple comprehension questions and match sentences about texts.	GRAMMAR, READING, MAIN COURSE SPEAKING, LISTENING, VOCABULARY am/is/are my/your This is... Introduction dialogues, Everyday English dialogues Introductions, Good morning! Practicing introduction dialogues. People meet each other and introduce someone else. How are you? What's this in English? Numbers 1-10 and plurals.	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	3	3. Reconstruct texts by reordering sentences. 4. Understand the main idea of a text.	He/she/they His/her. Questions Where are they from? Two people are on holiday in New York. Students ask and answer questions about where people are from. Countries, Numbers 10-20, 11-30. A set of cities and countries: Brazil, Spain... Adjectives: awful, really good, fantastic, beautiful Nouns: centre, hospital, building, park	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
3	3	5. Identify specific information in a text. Writing and paraphrasing paragraphs.	Verb to be is recycled and extended to include negative and question forms. We're in Las Vegas! Roleplay: in a band. An interview with the band Metro 5. Jobs: a nurse, a doctor. Personal information: surname, first name, address, married ... Social expressions: I'm sorry, thanks, please...	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
4	3		Possessive adjectives. Possessive 's. Has/ have Adjective + noun Irregular Plurals Paddy McNab and his family, best friend. The alphabet, On the phone, Saying email addresses. Who	Board and interactive whiteboard	- Daily exams - Homework Monthly exams

			they? Listen and identify the people. The family: mother, son. Describing a friend: very beautiful, really funny...		
5	3		Present Simple: I/you/we/they a/an Adjective + noun Colin Brodie from Dundee. Role play: At a party. Where is Colin? Who is he with? At a party: Fiona and Terry are at a party in London. The lexical set of sports/food/drinks. Languages and nationalities.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
6	3		Present Simple: He/she Question and negatives Adverbs of frequency Prepositions of time Lois Maddox Talking about daily routines, Asking and answering questions about daily routines, Lifestyle questionnaire Listening a phone conversation between Lois and Elliot. Days of the week. The time. Words that go together: watch TV, get up early...	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
7	3		Question words Subject Pronouns Object Pronouns Possessive Pronouns This and that A postcard from San Francisco, A holiday postcard. Describing lifestyles, preferences and places, Roleplay: conversations in town. Listening the requests with Can I.....? Adjectives: lovely, terrible, comfortable, friendly... Opposite adjectives: new/old, big/small Places: chemist, post office	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
8			There is /are Prepositions: in, on, under next to Vancouver-the best city in the world, What to do and where to go. Talking and asking about rooms and furniture, Giving directions. My hometown, Steve talks about living in Vancouver. Rooms and furniture: living room, bedroom ... In and out of town beach, mountain, sailing,...	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
9	3		Was/were born Past simple: irregular verbs It's a Jackson Pollock. Telling a story from pictures, Saying the dates in English. Magalie Dromand, Magalie dromand talks about her family. Saying years People and jobs Irregular verbs Have, do, go: have lunch, do homework, go shopping	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
10	3		Past simple: regular and irregular	Board and	- Daily exams - Homework

		Questions Negatives Ago Dialogues with simple past. Did you have a good weekend? Asking about holidays, A questionnaire, My last holiday, Roleplay: asking and giving directions. Angie and Rick are at work, Jack and Millie's holiday. Weekend activities: go to the cinema, have a meal... Time expressions: on Monday, last night... Sports and leisure: tennis, skiing, windsurfing... Play or go: play tennis, go skiing... Seasons: winter, summer...	interactive whiteboard	Monthly exams
11	3	Can / can't, Adverbs, Adjective + noun Requests and offers The Internet, what can you do on the internet? Talking about what you can do, talking about everyday problems, Five people talk about what they do on the internet. Verbs: draw, run, drive... Verb noun: Listen to the radio, chat to friends Adjective noun: fast car, busy city, dangerous sport Opposite adjectives dangerous/ safe, old/modern, old/young.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
12	3	I'd like, You are what you eat, Discussion-what is a good diet? Conversation with Adam, Shopping: bread, milk, fruit, Please and thank you Some /any, Like and would like People from different parts of the world describe what they eat. Roleplay: Ordering a meal. Birthday wishes, what people want on their birthday. stamps, cheese, ham... Food: cereal, salad, pasta, fish... In a restaurant: menu, starter, desert, soup, salmon	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
13	3	Present continuous, Present simple and present continuous. This week is different, Colin, a millionaire, gives money to homeless teenagers What's the matter? Why don't you ....? What is Nigel wearing? Nigel is on holiday, What's the matter. Colors: blue, red, green... Clothes: jacket, trousers, shoes and socks... Opposite verbs: buy/sell, love/hate, open/close...	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
14	3	Future plans, Revision: question	Board and	- Daily exams - Homework

			words, tenses. Seven countries in seven days, Life's big events: three people talk about their family, education, work and ambitions. A mini autobiography. Eddie is talking to a friend about his holiday plans, social expressions Transport: travel by bus, coach, motorbike, plane... Revision	interactive whiteboard	Monthly exams
15	3		Irregular verbs, phonetic symbols, consonants and vowels.	Board and interactive whiteboard	- Daily exams - Homework Monthly exams
16	3		Preparatory week before the final Exam	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams

### 143. 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

### 144. Learning and Teaching Resources

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

# المرحلة الثانية

## Course Description Form

145.	Course Name:		
<b>Organic chemistry</b>			
146.	Course Code:		
<b>202CHOC1</b>			
147.	Semester / Year:		
Second Year			
148.	Description Preparation Date:		
2023 /9/1			
149.	Available Attendance Forms:		
mandatory			
150.	Number of Credit Hours (Total) / Number of Units (Total)		
150 hours , 8 Units			
151.	Course administrator's name (mention all, if more than one name)		
Name: Assist.prof.Dr.Wassan Baqir Ali Email: <a href="mailto:dr.wassan976@uodiyala.edu.iq">dr.wassan976@uodiyala.edu.iq</a> Assist.prof.Dr.Liqaa adnane mohammr <a href="mailto:liqaaadnan@uodiyala.edu.iq">liqaaadnan@uodiyala.edu.iq</a>			
152.	Course Objectives		
<b>Course Objectives</b>	Teaching the student organic chemical reactions and chemical structures and knowledge of the structure of organic compounds and clarification of the mechanics of organic reactions and their practical applications aimed at developing and keeping pace with the scientific development of organic chemistry Teaching and educating students all the necessary information related to organic chemistry, which qualifies them to work and research in all areas of organic chemistry		
153.	Teaching and Learning Strategies		
<b>Strategy</b>	Explanation and clarification Lecture method and questioning method Model display method		

154. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introducing the student organic chemistry and importance in our lives	Introduction to organic chemistry	Board and data show	Daily exams Homework Monthly exam
2	5	Definition the student with hydrocarbons and their types	Hydrocarbons	=	=
3	5	Introducing the student methane gas and preparation method	Saturated hydrocarbons primarily methane properties	=	=
4	5	Introduce the student alkanes and their properties	Preparation of alkanes and their properties	=	=
5	5	Introduce the student the reactions of alkanes	Reactions of Alkanes	=	=
6	5	Definition of unsaturated hydrocarbons and their types	Unsaturated hydrocarbons	=	=
7	5	Alkenes naming and properties	Nomenclature of alkenes and properties	=	=
8	5	Introduce the student the methods of preparation alkenes	Preparation method alkenes	=	=
9	5	Introduce the student the reactions of alkenes	Reaction of alkenes	=	=
10	5	Introduce the student the alkynes, their properties and their names	Alkynes, naming, properties and properties	=	=
11	5	Reactions of alkenes	Reactions of alkenes	=	=
12	5	Introducing the student Dienes and their Properties	Dienes, structure synthesis stabilization	=	=
13	5	Introduce reaction Dienes to student	Reactions of Dienes	=	=
14	5	Introduce the student aliphatic cyclic compounds, their characteristics, naming preparation and reactions	Aliphatic cyclic compounds, structure physical properties synthesis, and reactions	=	=
15	5	First Exam			
16	5	Definition of the aromatic compounds, their properties and naming	Aromaticity, structure and stability of benzene	=	=
17	5	Introduce the student the aromatic compounds	The Hückel $4n + 2$ rule synthesis electrophilic aromatic	=	=

			substitution		
18	5	Introduce the student the reactions of aromatic compounds	Electrophilic aromatic substitution of aromatic compounds	=	=
19	5	Arenes, structure, synthesis and reactions	Arenes, structure, synthesis and reactions	=	=
20	5	Introduce the student the properties of alkyl halides	Alkyl halide, structure and physical properties	=	=
21	5	Methods for Synthesis of alkyl halides	Synthesis of alkyl halides	=	=
22	5	reactions SN1	reactions SN1	=	=
23	5	Reactions and mechanism of SN2	Reactions and mechanism of SN2	=	=
24	5	Reactions and mechanism of E1	Reactions and mechanism of E1	=	=
25	5	Reactions and mechanism of E2	Reactions and mechanism of E2	=	=
26	5	Alcohols, structure and physical properties	Alcohols, structure and physical properties	=	=
27	5	synthesis, and reactions of Alcohols	synthesis, and reactions of Alcohols	=	=
28	5	Ethers, structure and physical properties	Ethers, structure and physical properties	=	=
29	5	synthesis and reactions of Ethers	synthesis and reactions of Ethers	=	=
30	5	Second Exam			

155.

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

#### 156. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic chemistry, Morrison and Boyd (1)
Main references (sources)	Organic Chemistry, Clayden J., Creeves Warren S and Wothers P., Oxford, 2001
Recommended books and references (scientific journals, reports...)	www.chemicalprocessing.com
Electronic References, Websites	www.bytoco.com

## Course Description Form

<b>1. Course Name:</b>					
physical chemistry					
<b>2. Course Code:</b>					
<b>201CHPC1</b>					
<b>3. Semester / Year: semester</b>					
Second year					
<b>4. Description Preparation Date:</b>					
1/10/2023					
<b>5. Available Attendance Forms:</b>					
<b>6. Number of Credit Hours (150) / Number of Units (8)</b>					
<b>7. Course administrator's name (mention all, if more than one name)</b>					
Name: Alaa Esa Sultan					
Email: <a href="mailto:alaaeese@uodiyala.edu.iq">alaaeese@uodiyala.edu.iq</a>					
<b>8. Course Objectives</b>					
<b>Course Objectives</b>	1- Giving the student broad information about physical chemistry 2- How the student knows how to understanding the chemistry of macromolecules				
<b>9. Teaching and Learning Strategies</b>					
<b>Strategy</b>					
<b>10. Course Structure</b>					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	The gases	• Definition, •Classification and Functions of	blackboard + PowerPoint	Daily exams and homework + monthly exams
2	5	The system and The energy	The system and The energy	blackboard + PowerPoint	Daily exams and homework + monthly exams

3	5	Reversible and irreversible processes	Reversible and irreversible processes	blackboard + PowerPoint	Daily exams and homework + monthly exams
4	5	Volume pressure work	- Volume pressure work	blackboard + PowerPoint	Daily exams and homework + monthly exams
5	5	The first-law of thermodynamics	Explain The first-law of thermodynamics	blackboard + PowerPoint	Daily exams and homework + monthly exams
6	5	Enthalpy	Explain the Enthalpy	blackboard + PowerPoint	Daily exams and homework + monthly exams
	5				
7	5	Enthalpy cycle	Explain Enthalpy cycle	blackboard + PowerPoint	Daily exams and homework + monthly exams
8	5	Standard enthalpy change of formation	Standard enthalpy change of formation	blackboard + PowerPoint	Daily exams and homework + monthly exams
9	5	Heat capacity	Explain Heat capacity	blackboard + PowerPoint	Daily exams and homework + monthly exams
10	5	The first exam for 5-10 the first semester	The first exam for 5-10 the first semester	blackboard + PowerPoint	Daily exams and homework + monthly exams
11	5	The joule experimental	The joule experimental	blackboard + PowerPoint	Daily exams and homework + monthly exams
12	5	The joule - Thomson effect	The joule - Thomson effect	blackboard + PowerPoint	Daily exams and homework + monthly exams
13	5	The relationship between $C_v$ and $C_p$	The relationship between $C_v$ and $C_p$	blackboard + PowerPoint	Daily exams and homework + monthly exams
45	5	The second law of thermodynamics	The second laws of thermodynamics	blackboard + PowerPoint	Daily exams and homework + monthly exams
15	5	Entropy	Explain Entropy	blackboard + PowerPoint	Daily exams and homework + monthly

					exams
16	5	Spontaneous processes and entropy	Spontaneous processes and entropy	blackboard + PowerPoint	Daily exams and homework + monthly exams
17	5	Entropy change for typical processes	Entropy changes for typical processes	blackboard + PowerPoint	Daily exams and homework + monthly exams
18	5	Second exam for 5- 18 the first semester		blackboard + PowerPoint	Daily exams and homework + monthly exams
19	5	Entropy of mixing ideal gases	Entropy mixing ideal gases	blackboard + PowerPoint	Daily exams and homework + monthly exams
20	5	Free energy functions	Free energy functions	blackboard + PowerPoint	Daily exams and homework + monthly exams
21	5	Maxwell relations	Derive Maxwell relations	blackboard + PowerPoint	Daily exams and homework + monthly exams
22	5	Gibbs-Helmholtz equation	Derive Gibbs-Helmholtz equation	blackboard + PowerPoint	Daily exams and homework + monthly exams
23	5	first exam for the 5- 23 second semester	first exam for the 5- 23 second semester	blackboard + PowerPoint	Daily exams and homework + monthly exams
24	5	Phase equilibrium	Explain Phase equilibrium	blackboard + PowerPoint	Daily exams and homework + monthly exams
25	5	Phase diagrams Mixtures	Phase diagrams of Mixtures	blackboard + PowerPoint	Daily exams and homework + monthly exams
26	5	Liquid -Liquid phase diagrams	Liquid -Liquid phase diagrams	blackboard + PowerPoint	Daily exams and homework + monthly exams
27	5	Statistical thermodynamics	Statistical Thermodynamics	blackboard + PowerPoint	Daily exams and homework + monthly exams

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily

preparation, daily oral, monthly, or written exams, reports .... etc

## 12. Learning and Teaching Resources

1. Books Required reading:	Phy.chem.gases and thermodynamics 1 A.F.Dawood Al-Niaimi
2. Main references (sources)	1-Phy.chem. water J.Moor 2-Phy.chem. Danials 3-Atkins 4-Phy.chem. J.Barroue 5-Element of chemical thermodynamic L.K.Nash 6-Thermodynamics for chemistry
A- Recommended books and references (scientific journals, reports...).	
B-Electronic references, Internet site	www.byPhysical Chemistry Books Adwww.scienceforums.com/forum/chemistr toco.com

## Course Description Form

157. Course Name:	
Theoretical Analytical Chemistry	
158. Course Code:	
206CHAC2	
159. Semester / Year:	
Second	
160. Description Preparation Date:	
161. Available Attendance Forms:	
Weekly/mandatory	
162. Number of Credit Hours (Total) / Number of Units (Total)	
163. Course administrator's name (mention all, if more than one name)	
Name:	
Email:	
164. Course Objectives	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>– Learning students analytical chemistry fundamentals in specific knowledge gravimetric analysis chemistry, classification of gravimetric analysis, precipitation analysis, types of precipitating reagents, inorganic precipitants and organic precipitants, properties of precipitant used for gravimetric analysis, calculation of gravimetric analysis, gravimetric factors, solubility of precipitates and Solubility product (<math>K_{sp}</math>), calculation the solubility from solubility problems, The affected factors on the solubility of the precipitates, Contamination of the precipitates and its types , avoiding impurities, digestion of precipitates, washing solution, drying and ignition of the precipitates, Statistic in analytical chemistry with examples.</li> <li>– Learning students, the fundamentals of analytical separation methods: classification of separation methods, masking agents, liquid–liquid extraction, solvent extraction fundamentals, separation and classification of chromatography, separation by ion exchanges.</li> <li>– Teaching and learning students all the subjects, that related to the analytical chemistry course, which allow them to be qualified working in different aspects of analytical chemistry</li> </ul>
165.	
<b>Strategy</b>	
166. Course Structure	

167.

week	Hours	Required Learning Outcomes	Unit or subject name	Learning methods	Evaluation methods
1.	2	Definition of the student in gravimetric analytical chemistry	Introduction of analytical chemistry, fundamentals of gravimetric analysis, sampling and sampling treatment	Whiteboard, data-show, and computer	Daily texts, homework, practical exams, and med term exams,
2.	2	Definition of the student in the steps of the gravimetric analysis	The steps of the gravimetric analysis, weight of a sample, solvent of a sample, precipitate of a sample, precipitant digestion, washing of a precipitant, precipitant burning, weight of a precipitant	=	=
3.	2	Definition of the student in classification of gravimetric analysis	Classification of gravimetric analysis, precipitation analysis, pyrolysis analysis, isolation analysis, the qualities of good precipitants	=	=
4.	2	Definition of the student in types of precipitating reagents,	Types of precipitating reagents, inorganic precipitants, and organic precipitants properties of precipitant used for gravimetric analysis	=	=
5.	2	Definition of the student in precipitating of homogenous solutions organic & inorganic precipitants	precipitating of homogenous solutions, types of homogenous solutions and its applications in gravimetric analysis organic & inorganic precipitants, and their types & advantages with examples	=	=
6.	2	Definition of the student in calculation of gravimetric analysis	The chemical composition of the precipitates, calculation of gravimetric analysis, gravimetric factor, and examples,	=	=
7.	2	Definition of the student in Solubility	Solubility of precipitates and Solubility product (Ksp), calculation the solubility from Ksp, solubility problems	=	=

8.	2	Exam 1	First Course	----	
9.	2	Definition of the student in the affected factors of the solubility and of the precipitates	The affected factors of the solubility: temperature, the physical and chemical nature of the solute, the nature of solvent, common ion effect, oxidation-reduction reactions effect	=	=
10.	2	Finish the definition in the affected factors of the solubility and of the precipitates	ionic strength of the solution, the effect of pH, the complex formation, the hydrolysis effect, particle size effect of solute, examples, and problems	=	=
11.	2	Definition of the student in Crystalline composition of the precipitates	Crystalline composition of the precipitates, their types & advantages with examples, and problems,	=	=
12.	2	Definition of the student in Colloid composition of the precipitate	Colloid composition of the precipitate and their types & advantages with examples, von-weimern for colloidal state	=	=
13.	2	Definition of the student in Contamination of the precipitates	Contamination of the precipitates, type of contamination, co-precipitation, post precipitation	=	=
14.	2	Definition of the student in treatment of the precipitates	Treatment of the precipitates, avoiding impurities, digestion of precipitates,	=	=
15.	2	Definition of the student in washing of precipitates	Washing of precipitates, washing solutions, drying and ignition of the precipitates	=	=
16.	2	Exam 2 First Course	First Course	=	
17.	2	Definition of the student in Statistic	Statistic in analytical chemistry with examples	=	=
18.	2	Definition of the student in separation methods	Introduction and fundamentals of separation methods, and their types	=	=
19.	2	Definition of the student in Classification of separation methods	Classification of separation methods, their advantages with examples,	=	=

20.	2	Definition of the student in separation by chemical precipitation	Separation by chemical precipitation and their applications with examples, masking agents	=	=
21.	2	Definition of the student in separation by distillation fundamentals	separation by distillation fundamentals, their types and applications, affected factor on distillation separation.	=	=
22.	2	Definition of the student in extractions	Introduction of extraction separation, solvent extraction fundamentals, extraction methods, liquid-liquid extraction, solid-liquid extraction, extraction efficiency, examples	=	=
23.	2	Definition of the student in the affected factor on the extraction separation	The affected factor on the extraction separation, the effect of pH, the effect of complexes formation, extraction techniques	=	=
24.	2	Exam 1	Second Course	----	
25.	2	Definition of the student in Separation by chromatography	Introduction of Chromatographic separation, chromatographic separation fundamentals, chromatographic methods classification, mobile phase, and stationary phase	=	=
26.	2	Definition of the student in chromatographic separation methods	Thin layer chromatography, paper chromatography, column chromatography with adsorption, gas chromatography, applications with examples	=	=
27.	2	Definition of the student in chromatographic separation methods	Chromatographic separation techniques, separation by HPLC technique, ion exchange	=	=
28.	2	Definition of the student in the chromatographic analysis	Chromatographic analysis fundamentals, Van-Deemter equation, retention time, rate separation and resolution, resolution with retention time, rate and plate theories, examples with problems	=	=

29.	Definition of the student in separation by ion exchange	Separation by ion exchanges fundamentals, anion exchange, cation exchange, ion exchanges classification, capacity of ion exchange, equilibrium of ion exchange with examples and applications	Whiteboard, data-show, and computer	=	
30.	Exam 2	Second course	----		

### 168. 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

### 169. Learning and Teaching Resources

1. Books Required reading:	Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M. West. Eight Edition
2. Main references (sources)	<p>1: Analytical Chemistry, Gary, Christian Sixth Edition</p> <p>2: Chemical Analysis, Modern Instrumentation Methods and Techniques, Francis Rouessac and Annick Rouessac Second Edition</p> <p>3: الاسس العامة للتحليل الكيميائي والوزني، تاليف الدكتور صفاء رزوقي المرعب، جامعة بغداد، كلية التربية – ابن الهيثم، 1988.</p> <p>4: اسس الكيمياء التحليلية، الدكتور مؤيد قاسم العبايجي والدكتور ثابت سعيد الغبشة، جامعة الموصل، 1983.</p> <p>5: التطبيقات العملية في التحاليل الكيميائية وطرائق الفصل. د. اسماعيل خليل الهيتي</p>

## Course Description Form

1. Course Name:	
Mathematics	
2. Course Code:	
203CHM2	
3. Semester / Year:	
Second	
4. Description Preparation Date:	
1/3/2024	
5. Available Attendance Forms:	
Weekly/mandatory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 / 4	
7. Course administrator's name (mention all, if more than one name)	
Name:	
Email:	
8. Course Objectives	
<b>Course Objectives</b>	<p>Teaching the student differential equations, matrices, and determinants, methods solving them, performing mathematical operations on them, and how to use them in various scientific subjects and harnessing them to solve the mathematical problems that arise in all scientific subjects.</p> <p>Teaching and teaching students all the necessary information related to mathematics which qualifies them to model scientific concepts into mathematical ratios</p>
9. Teaching and Learning Strategies	
<b>Strategy</b>	<p>Electronic lecture method using the computer</p> <ul style="list-style-type: none"> <li>- Explanation and clarification</li> <li>- Providing students with the basics and additional topics related to differential equations, matrices, and determinants</li> <li>- Forming discussion groups during lectures to discuss mathematical operations on differential equations, matrices, and determinants that require critical thinking, analysis, and comparison.</li> </ul> <p>Asking students a set of thinking questions during lectures, such as what, how, when, and why for specific topics</p> <p>3</p> <p>Giving students homework that requires self-explanation in causal ways</p>

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1		Introducing student to differential equations and their importance	Introduction to differential equations	Use pen and blackboard to present the lecture	Daily exams and homework, in addition to month exams
2		Introducing the student to the application of differential equations	Ordinary differential equations	=	=
3		Introducing the student how to solve D.E.	Solutions of ordinary differential equations	=	=
4		Introducing the student how to solve D.E.	Equations of first order and first order	=	=
5		Introducing the student how to solve D.E.	Separable of variable	=	=
6		Introducing the student how to solve D.E.	Solving homogeneous differential equations	=	=
7		Introducing the student how to solve D.E.	Set of linear equations with constant equations	=	=
8		Introducing the student how to solve D.E.	Methods for solving linear equations	=	=
9		Introducing the student how to solve D.E.	Solutions of differential equations using series	=	=
1		Introducing the student how to solve D.E.	Solutions of differential equations using series 2 Bessel equation	=	=
1		Introducing the student how draw vectors	Vector space Independence is linear	=	=
1		Introducing the student how to use matrices solve problem in life.	Matrices	=	=
1		Introducing the student how to Determinants	Determinants	=	=

1	Introducing the student how to solve linear algebraic equations	Solutions of linear algebraic equations	=	=
1	Introducing student. Special types of arrays	Special types of arrays.	=	=
1	Introducing the student how to find eigenvalues	Eigenfunctions and eigenvalues	=	=

### 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

1. المعادلات التفاضلية للفيزيائيين (حلول وتطبيقات فيزيائية) ، جاسم حسن رشيد، 2013	
2. Matrix Mathematics: Theory, Facts, and Formulas: Second Edition / Edition 2 by Dennis S. Bernstein	
1. elementary differential equations rainville 7th edition solution manual by William F. Trench, Ph.D.	
3. Matrices and Linear Transformations by Charles G. Cullen, Culten	
<a href="http://www.mathwords.com">www.mathwords.com</a>	

## Course Description Form

1. Course Name:
<b>Inorganic chemistry</b>
2. Course Code:
<b>205CHIN2C</b>
3. Semester / Year:
Second Year
4. Description Preparation Date:
2023 /9/1
5. Available Attendance Forms:
mandatory
6. Number of Credit Hours (Total) / Number of Units (Total)
150 hours , 8 Units
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer.Dr.Khansa Yousif Ahmed

Email: [khansa@uodiyala.edu.iq](mailto:khansa@uodiyala.edu.iq)

## 8. Course Objectives

<b>Course Objectives</b>	Teaching the students all the necessary information about the Inorganic chemistry subject which make them able to work in the field of Inorganic Chemistry
	Give idea about the periodic properties of the elements, study the molecular symmetry, study the standard electrode potential, study and classification of Acids and Bases, Explanation of Main elements in the periodic table from group 3 to 7. Study the basis of Solid State Chemistry including crystal system of Cube. Study the Magnetochemistry

## 9. Teaching and Learning Strategies

<b>Strategy</b>	<p>Explanation and clarification</p> <p>Lecture method and questioning method</p> <p>Model display method</p>
-----------------	---

## 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Explanation about properties of periodic table	The arrangement of elements inside the periodic table studying the periodic properties such as ionic atomic size. Ionization energy electronegativity and electron affinity	Board and data show	Daily exams Homework Monthly exam
2	5	Physical properties of s elements and taking it as a to get the chemical behavior depending on the location of these elements in the periodic table	Some periodic properties such as metallic and nonmetallic properties, oxidation states oxides (acidic, basic amphoteric) Oxides ( ionic covalent and middle)	=	=
3	5	Explain how the colors of elements and complexes form because of the absorption of specific wave of visible light		=	=
4	5	Explain the standard electrode potential and the relationship with pH of the solution	Standard electrode potential the relationship between standard electrode potential and the relationship with of the solution	=	=
5	5	Explain the Electromotive force and the meaning	Types of Electromotive force and Disproportionation	=	=

		disproportionation			
6	5	Giving Exercise to find how the student understand lectures	Molecular Symmetry, importance of symme Operations and elements symmetry. Point groups	=	=
7	5	Explain the properties molecules	Molecular Symmetry, importance of symme Operations and elements symmetry. Point groups	=	=
8	5	Giving Exercise to find how the student understand lectures	Acids and Bases	=	=
9	5	Assessment for the student how far he understand and scientific knowledge	Solid and Soft A and Bases	=	=
10	5	Explain the Acids and Base		=	=
11	5	Explain the basics of complexes forms between ligands and ions		=	=
12	5	Explain the basics of complexes forms between ligands and ions		=	=
13	5	Explain the magn properties of substances	Magnetochemistry: Ferromagnetic and A ferromagnetic, Magn momentum and EPR spin	=	=
14	5	Explain the magn properties of substances	Orbital and spin role magnetic momentum, ESR	=	=
15	5	Explain the basics solid state chemis crystal system	basics of solid s chemistry Pacl methods, C crystal system		
16	5	Crystal structure determination of cry formula and determination shape of crystal	Ionic compounds and X-Ra	=	=
17	5	Explain the basics of solid s chemistry, crystal system	Basics of solid stst	=	=
18	5	Crystal structure determination of cry formula and determination shape of crystal	Ionic compound and structure	=	=
19	5	Giving Exercise to find how the student understand lectures	Examples a	=	=
20	5	Explain Boron gro properties, reactions compounds	Introduction to bo group	=	=
21	5	Explain Carbon gro properties, reactions compounds	Introduction carbon group	=	=
22	5	Explain Nitrogen and compounds	Introduction to Fifth group (phosphorous, Arsenic, Bismuth and Antimon properties and compounds	=	=
23	5	Explain phosphorous, Arse Bismuth and Antimon	Introduction to Fifth group (phosphorous, Arsenic, Bismuth and Antimon properties and compounds	=	=
24	5	Assessment for the student	Exam	=	=

		how far he understand and scientific knowledge			
25	5	Explain Oxygen compounds	Introduction to Oxygen, Coordination numbers of Oxygen, Ozone, Oxide ion Peroxides, Superoxide, ozonide	=	=
26	5	Explain about groups elements properties, existence in nature, structure reactions	Chemistry of sulfur	=	=
27	5	Explain about Sulfur and other group elements	Sulfur compounds and other group elements ( oxides, oxoacides fluorides sulfide hydrides	=	=
28	5	Explain about Halogen compounds, properties, Oxidation and oxidation states	Introduction to Halogens, properties Oxides, oxidation states and pseud-halides	=	=
29	5	Estimation the chemical behavior of halogens in their ionic and molecular structure oxoacides, types of halides	Activity series of halogens, Reactions, oxoacides hydrogen halides ,, ionic and covalent halides	=	=
30	5	Second Exam			

## 11.

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)	1980 الكيمياء اللاعضوية تأليف الدكتور نعمان النعيمي
Main references (sources)	1- Inorganic chemistry, principles of structure and reactivity, 2 <sup>nd</sup> ed., James E. Huheey, 1983 2-Inorganic chemistry, 3 <sup>rd</sup> ed., Housecroft C.E. and
Recommended books and references (scientific journals, reports...)	www.chemicalprocessing.com
Electronic References, Websites	www.bytoco.com

# المرحلة الثالثة

## Course Description Form

13. Course Name:					
<b>Physical Chemistry</b>					
14. Course Code:					
<b>301CHPC2</b>					
15. Semester / Year:					
<b>Third year</b>					
16. Description Preparation Date:					
<b>2024</b>					
17. Available Attendance Forms:					
<b>In person</b>					
18. Number of Credit Hours (Total) / Number of Units (Total)					
<b>150h - 8 units</b>					
19. Course administrator's name (mention all, if more than one name)					
<p><b>Name: Amir .F. Dawood</b>  <b>Email: <a href="mailto:dr.amer960@uodiyala.edu.iq">dr.amer960@uodiyala.edu.iq</a></b>  <b>Name: Ahmed Ismail Kareim</b>  <b>Email: <a href="mailto:ahmed_kandory@uodiyala.edu.iq">ahmed_kandory@uodiyala.edu.iq</a></b></p>					
20. Course Objectives					
<b>Course Objectives</b>		<p>The objective of this course is for students to gain a firm understanding of the mathematical and physical aspects of the behavior of chemical systems, chemical kinetics and the properties of matter, electrochemistry and photochemistry.</p>			
21. Teaching and Learning Strategies					
<b>Strategy</b>		<b>Engage, Explore, Explain, Elaborate, and Evaluate</b>			
22. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	To develop the basic knowledge of students about gases.	Gaseous molecular theory	Lecture, , Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked

					solve a homework
2	5	Students are taught the Distribution velocity	distribution molecular velocity	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
3	5		Maxwell-Boltzmann distribution	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
4	5		Energy distribution systems	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
5	5	Complete knowledge about spectroscopy.	Spectroscopy	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
6	5	Students come to know about photochemistry	Laws of photochemist	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
7	5		Exam	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
8	5		Selectivity of Photochemical Reactions	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
9	5		Molecular orbitals	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
10	5		Singlet Triplet States for Two Electrons	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
11	5		Selection rules	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked solve a homework assignment rela to the lesson
12	5		Types of electronic transitions	Lecture, Tutorials	The evaluation is done through c activities answer a set of questio and then the students are asked

					solve a homework assignment related to the lesson
13	5		Energy curves	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
14	5		Electronic spectroscopy	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
15	5		Franck-Condor principle	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
16	5		Exam	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
17	5		Photo sensitivity	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
18	5		Quantum yield	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
19	5	students get knowledge of chemical reactions.	Chemical kinetics	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
20	5	Make the students to be able to determine rate of reaction	Rate of reaction	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
21	5		Order of reaction and molecular	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
22	5		Integrated rate equations	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked solve a homework assignment related to the lesson
23	5		Half-life	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked

					solve a homework assignment related to the lesson
24	5		Exam	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
25	5	Have a good knowledge About the mechanism Of reaction	Collision theory activated-complex theory	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
26	5	Students get familiar with electrochemistry	Electrical conductance solutions	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
27	5		Dissociation constant Of electrolytes	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
28	5	Students get to learn Various types of cells	Electrochemical cells	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
29	5		Redox potential	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson
30	5	students are taught fundamental aspects surface chemistry	Surface chemistry	Lecture, Tutorials	The evaluation is done through class activities answer a set of questions and then the students are asked to solve a homework assignment related to the lesson

### 23. Course Evaluation

**Assignments and Report 10%, Quizzes 10%, Midterm Exam 30%, and Final Exam 50%  
Then the total is 100%**

### 24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<b>Thermodynamic and photochemistry By Dr. Jalal Mohamed Saleh</b>
Main references (sources)	<b>Physical chemistry by Atkins</b>
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<b>Physical chemistry:Books-Amazon.com</b>

## Course Description Form

13. Course Name:	
Organic Chemistry	
14. Course Code:	
302CHOC2	
15. Semester / Year:	
3 <sup>rd</sup> Year	
16. Description Preparation Date:	
1/9/2023	
17. Available Attendance Forms:	
mandatory	
18. Number of Credit Hours (Total) / Number of Units (Total)	
120 hours	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr. Luma Salman Abd Email: Luma_Salman@uodiyala.edu.iq	
20. Course Objectives	
<b>Course Objectives</b>	Teaching the student organic chemical reactions and chemical structures and knowledge of the structure of organic compounds and clarification of the mechanism of organic reactions and their practical applications aimed at developing and keeping pace with the scientific development of organic chemistry
21. Teaching and Learning Strategies	
<b>Strategy</b>	<ul style="list-style-type: none"> <li>- Clarification and explanation of the study materials by the academic staff through the blackboard, smart board and computer.</li> <li>- Providing students with knowledge through homework assignments for academic vocabulary</li> <li>- Asking students to visit the library to obtain additional knowledge of the study materials</li> <li>Improving students' skills by visiting websites to obtain additional</li> </ul>

knowledge of the study subjects

## 22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method
1	6	Introduction to carbonyl compounds	carbonyl compounds	Board and data show
2	6	properties of aldehydes and ketones	Aldehydes and ketones	=
3	6	Aldehydes and ketones reactions	Aldehydes and ketones	=
4	6	Methods of preparation	Aldehydes and ketones	=
5	6	The acidity of the hydrogen atom	Condensation reaction	=
6	6	Their reactions (aldol condensation)	Aldol condensation)	=
7	6	Carboxylic acids physical properties	Carboxylic acids	=
8	6	their chemical properties (chemical reactions)	Carboxylic acids	=
9	6	Methods of preparation	Carboxylic acids	=
10	6	Dicarboxylic acid Naming	Dicarboxylic acid	=
11	6	Methods of preparation	Dicarboxylic acid	=
12	6	Derivatives of carboxylic acids / Naming	Derivatives of carboxylic acids	=
13	6	(its chemical reactions)	Derivatives of carboxylic acids	=
14	6	Methods of preparation	Derivatives of carboxylic acids	=
15	6	Additional important information about carboxylic acid derivatives	Additional important information about Carboxylic acid derivatives	
16	6	Introduction to the stereochemistry of isomers	Stereochemistry	=
17	6	Types of isomers/ their properties and applications of stereochemistry in reactions	Stereochemistry	=
18	6	Aryl halides nomenclature and their physical properties	Aryl halides	=
19	6	(Their chemical reactions) and their application in the Diels Alder reaction	Aryl halides	=
20	6	Methods of preparation	Aryl halides	=
21	6	Ester enolate and	Ester enolate	=

		applications		
22	6	Alpha-beta unsaturated carbonyl compounds	Ester enolate	=
23	6	Special Additions of this type	Ester enolate	=
24	6	Amines and their physical properties	Amines	=
25	6	Preparation of amines	Amines	=
26	6	(its chemical reactions)	Amines	=
27	6	Introduction to the chemistry of heterocyclic rings	heterocyclic rings	=
28	6	Phenols and their physical properties with the name of the most important compounds	Phenol	=
29	6	its chemical reactions/ Preparation of phenols	Phenol	=
30	6	Second Exam		

11

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)	Organic chemistry, Morrison and Boyd (1)
Main references (sources)	1- Essential organic chemist second addition 2- Organic chemistry (sixth edition) 3- Interne
Recommended books and references (scientific journals, reports...)	www.chemicalprocessing.com
Electronic References, Websites	www.bytoco.com

## Course Description Form

<b>1. Course Name:</b>	
Industrial chemistry	
<b>2. Course Code:</b>	
303CHIC1	
<b>3. Semester / Year:</b>	
Third stage	
<b>4. Description Preparation Date:</b>	
5/5/2024	
<b>5. Available Attendance Forms:</b>	
Mandatory attendance	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
60 hours / 4 units	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: 1- Asst. prof. Dr. Noor sabah ahmed <a href="mailto:noorsabah@uodiyala.edu.iq">noorsabah@uodiyala.edu.iq</a> 2- Asst. prof. Dr. mohammed alwan farhan <a href="mailto:Mohammed.alwan@uodiyala.edu.iq">Mohammed.alwan@uodiyala.edu.iq</a>	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<p>Teaching the student about oil and polymer chemistry, knowledge of the petrochemical industries related to them, how to manufacture raw materials in the petrochemical industries, knowledge of corrosion and its types, pollution and its types, dyes and plastics and their practical applications aimed at developing and keeping pace with the scientific development of Yamiya Industrial.</p> <p>Teaching and teaching students all the necessary and essential information related to industrial chemistry, which qualifies them to work and research in all fields of industrial chemistry.</p>
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>Explanation and clarification</p> <p>Lecture method and questioning method</p> <p>Model display method</p>

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### 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to industrial chemistry and its importance in our lives	Historical introduction to branches of chemistry Types of chemical industries- Principles of chemical industries	Lecture using blackboard and data show and discussion	Daily exams, homework, and a monthly exam
2	2	Student knowledge of In chemical industries	Definitions and important information in the chemical industry	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
3	2	Student knowledge of economics of Chemical industries	Economics of chemical industries	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
4	2	The student knows basics of choosing chemical reactions	The foundations of selecting chemical reactions and the technology of transferring them to the industrial level	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
5	2	The student's knowledge of physical processes in chemical industries and separation methods	Physical processes in chemical industries and separation methods	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
6	2	The student's knowledge of the distillation process	Industrial units/distillation process	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
7	2	The student's knowledge of the chemical absorption process	Chemical absorption process	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
8	2	The student's knowledge of methods for the adsorption process	Adsorption process	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam
9	2	The student's knowledge of the	Extraction process	Lecture using blackboard and show and discussion	Daily exams, homework, and a monthly exam

		extract ion process			monthly exam
10	2	The student's knowledge of the nomination method	Filtration process	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
11	2	The student's knowledge of chemical reactions and chemical reactors	Chemical reactions and chemical reactors	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
12	2	Student definition of contributing factors (motivating factors)	Catalysts in the chemical industry	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
13	2	Introducing the student to how to calculate balance of matter in chemical industry	Calculating material balance in the chemical industry	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
14	2	Material balance calculations in combustion processes	Material balance calculations in combustion processes	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
15	2	Student knowledge of fuel and energy/oil/gas	Introducing the student to fuel energy/oil/gas	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
16	2	The student's knowledge of nuclear energy reactions	Nuclear Energy	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
17	2	Introducing the student to solar energy	solar energy	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
18	2	Introducing the student to water and its uses in the chemical industry	Water and its uses in chemical industry	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
19	2	The student's knowledge of water treatment - domestic and industrial	Water treatment - domestic and industrial	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
20	2	Student knowledge of pollution/air pollution	Pollution/air pollution	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
21	2	The student's knowledge of water and land pollution	Water and land pollution	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
22	2	The student's knowledge of corrosion methods	Corrosion	Lecture using blackboard and show and discussion	Daily exams, homework, an monthly exam
23	2	Introducing the student	Cement industry	Lecture using	Daily exams,

		to the cement industry		blackboard data show discussion	homework, and monthly exam
24	2	Introducing the student to the glass industry	Glass industry	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
25	2	The student's knowledge of soap making	soap production	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
26	2	Student knowledge of paper making	Paper Industry	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
27	2	The student's knowledge of sugar manufacturing methods	Sugar industry	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
28	2	The student's knowledge of fertilizer manufacturing methods	Fertilizer industry	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
29	2	The student's knowledge of applied electrochemical reactions and processes	Reactions of applied electrochemical processes	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam
30	2	Student knowledge of electroplating	Electroplating	Lecture using blackboard and show and discussion	Daily exams, homework, and monthly exam

### 11. Course Evaluation

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

### 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Foundations and applications in industrial chemistry / written by Dr. Latif Hariri/University of Mosul
Main references (sources)	Foundations of industrial chemistry / written by Dr. Aziz Ahmed Amin
Recommended books and references (scientific journals, reports...)	<a href="http://www.chemicalprocessing.com/">www.chemicalprocessing.com/</a>
Electronic References, Websites	<a href="http://www.bytoco.com">www.bytoco.com</a>

## Course Description Form

<b>1. Course Name:</b>					
Biochemistry					
<b>2. Course Code:</b>					
304CHBC1					
<b>3. Semester / Year:</b>					
yearly					
<b>4. Description Preparation Date:</b>					
2023/10/1					
<b>5. Available Attendance Forms:</b>					
<b>6. Number of Credit Hours (120) / Number of Units (2)</b>					
<b>7. Course administrator's name (mention all, if more than one name)</b>					
Name: Ekhlash Abdallah Hassan Email: <a href="mailto:ekhlashbiochemistry@gmail.com">ekhlashbiochemistry@gmail.com</a> <a href="mailto:ekhlashabdallah@uodiyala.edu.iq">ekhlashabdallah@uodiyala.edu.iq</a>					
<b>8. Course Objectives</b>					
<b>Course Objectives</b>	<b>1- Giving the student broad information about biochemistry</b> <b>2- How the student knows how to understanding the chemistry of macromolecules</b> <b>3- Giving the student sufficient information bout macromolecules and knowing the chemical sources related to them,</b>				
<b>9. Teaching and Learning Strategies</b>					
<b>Strategy</b>	<b>Engage, Explore, Explain, Elaborate, and Evaluate</b>				
<b>10. Course Structure</b>					
<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
1	4	CARBOHYDRATE CHEMISTRY	<ul style="list-style-type: none"> <li>• Definition,</li> <li>•Classification and Functions of Carbohydrates n</li> <li>• Structure of</li> </ul>	blackboard + PowerPoint	Daily exams and homework + monthly exams

			Glucose		
2	4	CARBOHYDRATE CHEMISTRY	<ul style="list-style-type: none"> <li>• Isomerism</li> <li>• Mutarotation</li> <li>• Chemical Properties of Monosaccharides</li> <li>• Glycoside Formation</li> </ul>	blackboard + PowerPoint	Daily exams and homework + monthly exams
3	4	CARBOHYDRATE CHEMISTRY	<i>Derivatives of Monosaccharides</i> <ul style="list-style-type: none"> <li>• Disaccharides</li> <li>• Polysaccharides (Glycans) <ul style="list-style-type: none"> <li>• Glycoproteins</li> </ul> </li> </ul>	blackboard + PowerPoint	Daily exams and homework + monthly exams
4	4	CHEMISTRY OF LIPIDS	<i>-Definition, Classification and Functions of Lipids</i> <ul style="list-style-type: none"> <li>• Fatty Acids</li> <li>• Essential Fatty Acids</li> </ul>	=	=
5	4	CHEMISTRY OF LIPIDS	<ul style="list-style-type: none"> <li>• Reactions of Lipids</li> <li>Characterization of Fat <ul style="list-style-type: none"> <li>• Triacylglycerols or Triacylglycerides or Neutral Fat</li> </ul> </li> </ul>	=	=
6	4	CHEMISTRY OF LIPIDS	<i>Phospholipids</i> <ul style="list-style-type: none"> <li>• Glycolipids</li> <li>Cholesterol</li> <li>Lipoproteins</li> </ul>	=	=
7	4	CHEMISTRY OF LIPIDS	<i>Eicosanoids</i> <ul style="list-style-type: none"> <li>• Micelles, Lipid Bilayer and Liposomes</li> <li>Detergents</li> </ul>	=	=
8	4	CHEMISTRY OF PROTEINS	<ul style="list-style-type: none"> <li>• General Nature of Amino Acids</li> </ul>	=	=

			<i>Classification of Amino Acids</i>		
9	4	CHEMISTRY OF PROTEINS	<ul style="list-style-type: none"> <li>• <i>Modified or Nonstandard Amino Acids</i></li> <li><i>Properties of Amino Acids</i></li> </ul>	=	=
10	4	CHEMISTRY OF PROTEINS	<ul style="list-style-type: none"> <li>• <i>Biologically Important Peptides</i></li> <li>• <i>Definition, Classification and Functions of Proteins</i></li> <li>• <i>Structure of Proteins</i></li> <li>• <i>Properties of Proteins</i></li> <li>• <i>Denaturation of Proteins</i></li> </ul>	=	=
11	4	ENZYMES	<ul style="list-style-type: none"> <li>• <i>Definition</i></li> <li>• <i>Zymogen or Proenzyme</i></li> <li>• <i>Cofactors (Coenzyme and Activator)</i></li> <li>• <i>How Enzymes Work</i></li> <li>• <i>Mechanism of Enzyme Action</i></li> </ul>	=	=
12	4	ENZYMES	<ul style="list-style-type: none"> <li><i>Enzyme Classification</i></li> <li>• <i>Specificity of Enzyme Action</i></li> <li>• <i>Factors</i></li> </ul>	=	=
13	4	ENZYMES	<ul style="list-style-type: none"> <li><i>Affecting the Velocity of Enzyme Reaction</i></li> <li>• <i>Enzyme Kinetics</i></li> <li>• <i>Enzyme Inhibition</i></li> </ul>	=	=
14	4	ENZYMES	<ul style="list-style-type: none"> <li><i>Allosteric Enzyme</i></li> <li>• <i>Isoenzyme</i></li> <li>• <i>Clinical Significance of Enzymes</i></li> </ul>	=	=

15	4	CHEMISTRY OF NUCLEIC ACIDS	<i>Nucleic Acids</i> • <i>Nucleotide</i> • <i>Biologically Important</i>	=	=
16	4	CHEMISTRY OF NUCLEIC ACIDS	<i>Nucleotides</i> • <i>Synthetic Analogues of Nucleotides or Antimetabolites</i> •	=	=
17	4	CHEMISTRY OF NUCLEIC ACIDS	<i>DNA Structure and Function</i> • <i>Organization of DNA</i> • <i>RNA Structure and Function</i>	=	=
18	4	vitamins	<i>Definition and Classification of Vitamins</i>	=	=
19	4	vitamins	• <i>Water Soluble Vitamins</i>	=	=
20	4	vitamine	• <i>Fat Soluble Vitamins</i>	=	=
21	4	<b>MECHANISM OF HORMONE ACTION</b>	• <i>Classification of Hormones</i> • <i>Mechanism of Hormone Action</i>	=	=
22	4	<b>MECHANISM OF HORMONE ACTION</b>	• <i>Mechanism of Hormone Action at Cytosolic or Nuclear Level</i>	=	=
23	4	<b>MECHANISM OF HORMONE ACTION</b>	• <i>Cell Membrane Receptor Mechanism of Hormone action</i>	=	=
24	4	CHEMISTRY OF HEMOGLOBIN	• <i>Structure and Function of</i>	=	=
25	4	CHEMISTRY OF HEMOGLOBIN	<i>Hemoglobin</i> • <i>Binding Sites for Oxygen, Hydrogen (H<sup>+</sup>) and Carbon dioxide (CO<sub>2</sub>) with Hemoglobin</i>	=	=
26	4	CHEMISTRY OF	• <i>Tense (T) and</i>	=	=

		HEMOGLOBIN	Relaxed (R) Forms of Hemoglobin • Types of Normal and Abnormal Hemoglobin • Derivatives of Hemoglobin		
27	4	PLASMA PROTEINS AND IMMUNOGLOBULINS	• Plasma Proteins	=	=
28	4	PLASMA PROTEINS AND IMMUNOGLOBULINS	Immunoglobulins (Ig)	=	=

### 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

1. Books Required reading:	ESSENTIALS OF BIOCHEMISTRY. Pankaja Naik PhD Professor and Head Department of Biochemistry MVPS Dr Vasantao Pawar Medical College Nashik, Maharashtra India
2. Main references (sources)	Harper's Illustrated Biochemistry, 31e
A- Recommended books and references (scientific journals, reports...).	
B-Electronic references, Internet sites...	Textbook of Biochemistry - Medical Students, 6th Edition

## Course Description Form

1. Course Name:	
Inorganic chemistry3	
2. Course Code:	
305CHIC3	
3. Semester / Year:	
Third Year	
4. Description Preparation Date:	
1/9/2023	
5. Available Attendance Forms:	
mandatory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
120 hours , 6 ECTS	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. prof. Dr. Areej Ali Jarullah Email: <a href="mailto:dr.areej977@uodiyala.edu.iq">dr.areej977@uodiyala.edu.iq</a> Assist. prof. Jinan Mohammed Mahmood <a href="mailto:jinan.mohammed@uodiyala.edu.iq">jinan.mohammed@uodiyala.edu.iq</a>	
8. Course Objectives	
<b>Course Objectives</b>	Teaching the student inorganic chemical reactions and chemical structures, knowledge of the structure of inorganic compounds and how to clarify the mechanics of inorganic reactions and their practical applications aimed at developing and keeping pace with the scientific development of inorganic chemistry  Teaching and educating students on all necessary and necessary information related to inorganic chemistry, which qualifies them to work and research in all areas of inorganic chemistry
9. Teaching and Learning Strategies	
<b>Strategy</b>	Explanation and clarification Lecture method and questioning method Model display method

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction to the chemistry of transitional elements, Some periodic properties and oxidation states of transitional elements	Transitional elements	Board and data show	Daily exams Homework Monthly exam
2	4	A historical look at the development of coordination chemistry, Chain theory, Warner's coordination theory	Coordination Chemistry	=	=
3	4	Coordination number, Type of ligands, Nomenclature of coordination complexes,	Coordination Chemistry	=	=
4	4	Isomerism in metal Complexes	Coordination Chemistry	=	=
5	4	The effective atomic number rule	Theories that explain the coordination complexes	=	=
6	4	Valence bond theory- Hybridization of atomic orbitals	Theories that explain the coordination complexes	=	=
7	4	Crystal field theory	Theories that explain the coordination complexes	=	=
8	4	Crystal field stabilization energy for strong and weak field complexes, A comparison between valence bond theory and crystal field theory	Theories that explain the coordination complexes	=	=
9	4	First exam - first semester			
10	4	Molecular orbital theory, Orbital Symmetry	Theories that explain the coordination complexes	=	=
11	4	Various preparation methods Substitution reactions in aqueous and non-aqueous solvents and in the absence of the solvent, Thermal dissociation of complexes, oxidation-reduction reactions	Methods for preparing the coordination complexes and their interactions	=	=
12	4	ligand mechanism (SN1, SN2)	Methods for preparing the coordination complexes and their interactions	=	=
13	4	Homogeneous and heterogeneous catalytic Agents	Catalysis	=	=
14	4	Preparation isomerism of cis and trans.	Trans effect	=	=
15	4	Second exam - first semester			

16	4	Magnetic properties of coordination complexes	Properties of coordination complexes	=	=
17	4	Spectral properties of coordination complexes	Properties of coordination complexes	=	=
18	4	Kinetic stability, thermodynamic stability	Stability of complexes formation in solutions	=	=
19	4	Calculation of stability constants of coordination complexes and factors affecting them	Stability of complexes formation in solutions	=	=
20	4	Labile and Inert Complexes	Stability of complexes formation in solutions	=	=
21	4	A comparative study of the elements of the three transition chains	Transition Elements	=	=
22	4	First exam - second semester			
23	4	Its preparation	Carbonyl chemistry	=	=
24	4	Reactions and properties	Carbonyl chemistry	=	=
25	4	Introduction to organometallic complexes	Organometallic complexes	=	=
26	4	Preparations and reactions	Organometallic complexes	=	=
27	4	Properties	Organometallic complexes	=	=
28	4	Introduction to the internal transition elements chemistry (Lanthanides and Actinides)	Internal transition elements	=	=
29	4	Comparison A comparative study of lanthanides and transition elements	Internal transition elements	=	=
30	4	Second exam - second semester			

## 11.

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)	Inorganic chemistry - chemistry of transition elements, principles of coordination, Dr. Noman Al-Naimi and others.
Main references (sources)	-Inorganic chemistry, Catherine E. Housecroft and Alan G. Sharpe, 3 <sup>rd</sup> ed., 2008. -Inorganic chemistry, Catherine E. Housecroft and Alan G. Sharpe, 4 <sup>th</sup> ed., 2012. -Inorganic chemistry, James E. Huheey, Ellen A. Keiter and Richard L. Keiter, 4 <sup>th</sup> ed., 1993.
Recommended books and references (scientific journals, reports...)	

## Course Description Form

<b>1. Course Name:</b>	
Environmental pollution	
<b>2. Course Code:</b>	
306CHEP	
<b>3. Semester / Year:</b>	
First semester/third stage	
<b>4. Description Preparation Date:</b>	
2024/10/1	
<b>5. Available Attendance Forms:</b>	
Weekly/ mandatory	
<b>6. Number of Credit Hours (30) / Number of Units (2)</b>	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Wafaa Sh. Al-Zuhairi Email: wafaashamkhi@uodiyala.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<p>1- Giving the student broad information about environmental pollution and knowing the sources that lead to environmental pollution around us.</p> <p>2- How the student knows how to treat pollution and get rid of its sources.</p> <p>3- Giving the student sufficient information about water pollution, soil pollution, and air pollution, knowing the chemical sources related to them, and how to get rid of harmful environmental pollutants in safe ways.</p>
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Lectures using data show</li> <li>• Oral explanation</li> <li>• Illustration using white board and animated vedios</li> </ul>

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**10. Course Structure**

<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
1	2		Sufficient information about the environment around us	Blackboard/Powerpoint	Daily exams and homework, in addition to monthly exams
2	2	Water Pollution	Adequate information about the sources of water pollution	=	=
3	2	air pollution	Sufficient information about pollution around us	=	=
4	2	Oil pollution	Sufficient information about pollution and its impact on the environment	=	=
5	2	Radioactive pollution	Pollution resulting from radioactive elements	=	=
6	2	Climate change	Sufficient information about climate change and its impact on the environment	=	=
7	2	Heavy elements	Sufficient information about pollution resulting from heavy metals and its impact on the environment	=	=
8	2	First month exam	A theoretical exam on the subject mentioned above	=	=

9	2	Soil contamination	Soil pollution and what are the sources of this pollution	=	=
10	2	Renewable energy	Adequate information about renewable energy and the sources of this energy	=	=
11	2	Green buildings and their role in reducing environmental pollution	The role of green buildings in reducing environmental pollution	=	=
12	2	Depleted uranium	Pollution from depleted uranium	=	=
13	2	Water analysis	Sufficient information about water analyses	=	=
14	2	Noise Pollution	Sufficient information about noise pollution in environment around us	=	=
15	2	Second month exam	A theoretical exam on the subject mentioned above		

### 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)	Environmental Chemistry book written by Gary Van Loon and Steven Duffy
Main references (sources)	Environmental pollution, its sources and types Science and Technology Magazine
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

## Course Description Form

25.	Course Name:		
		Surface Chemistry	
26.	Course Code:		
		<b>307CHSC</b>	
27.	Semester / Year:		
		Semester	
28.	Description Preparation Date:		
		1-Sept-2023	
29.	Available Attendance Forms:		
		-----	
30.	Number of Credit Hours (Total) / Number of Units (Total)		
		Two hours per week/	
31.	Course administrator's name (mention all, if more than one name)		
		Name: Muaathe A Ibraheem Email: <a href="mailto:Muaathe.a@gmail.com">Muaathe.a@gmail.com</a> ; m.a.ibraheem@uodiyala.edu.iq	
32.	Course Objectives		
<b>Course Objecti</b>		<ul style="list-style-type: none"> <li>• This course is designed to help students to understand the different surface phenomena and its fundamental background. The course deals with chemical and physical phenomena that are important within heterogeneous catalysis and understanding the colloidal state</li> </ul>	
33.	Teaching and Learning Strategies		
<b>Strategy</b>		<ul style="list-style-type: none"> <li>▪ Using both summative and formative assessments for better evaluation of learning.</li> <li>▪ give clear and detailed instructions.</li> <li>▪ concentrate on the main terms and concepts.</li> <li>▪ Boost student engagement with effective questioning techniques.</li> <li>▪ Asking relevant and thoughtful questions can encourage participation and enhance classroom discussions.</li> </ul>	

### 34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding Miller indices Include surface-specific phenomena	Miller Indices, Surface energy.	presentation	Discussion with students,
2	2	Understanding Young equation and their relation to wetting and surfactant action is crucial to this course. Describe the relation between surface stability and surface energy Give a brief description of the concept of surface relaxation and reconstruction	Younge equation, wettability, surface instability, relaxation, reconstruction.		
3	2	Recognize the essential adsorption concept and adsorption isotherm.	Introduction to adsorption, type of adsorption, Surface Area of Adsorption, Adsorption isotherm types		
	2	Recognize the essential adsorption concept and adsorption isotherm. Understanding kinetic adsorption types			
4	2	Realizing catalyst fundamentals and catalysts classification	Kinetic of adsorption, Langmuir isotherm, BET isotherm, Determination of Specific Surface Area		
5	2	Extend knowledge catalysis theory Give a comprehensive explanation about catalyst deactivation.	Introduction to catalyst properties of the catalysts, catalyst classification, Heterogeneous catalysts Characteristics of effective catalyst		
6	2	Shows the catalysis process	Catalysis theories, Deactivation of catalysts Fouling, poisoning,		

	2	Concept and explain the selectivity of the catalysis process. Give a brief description related to catalyst preparation methods.	Thermal degradation and Sintering. promoter Test1		
7.	2	Explain what the colloidal state is	Catalysts process, selectivity of catalysts preparation of catalyst		
8.	2	Demonstrates in detail classification of colloidal state according to different criteria	Dry catalysts preparation methods, Wet catalyst preparation method		
9.	2	Extend learning of colloidal state classification.	Introduction Colloidal state, Dispersed Phase and Dispersion Medium		
10	2	Understanding the Coagulation or Flocculation, Hardy-Schulze rule	general physical properties of colloidal material		
11	2	Describe coagulation, including the coagulation system's properties and the coagulation system's classification.	Classification of colloidal material, according to physical state, Classification of colloids based on the nature of the interaction between dispersed phase and dispersion medium.		
12	2	Learn about the Coagulation or Flocculation of colloidal material	Tyndall Effect, mechanical properties colloidal. Electrical Properties of Colloidal Solutions,		
13	2	Understand the principle of the Hardy-Schulze rule Explain the Electro-osmosis, Protective Colloids and Gold Number	exam		
14			The coagulation principle of colloidal state, Coagulation system classification, flocculation of colloidal material and fluctuate		

15			factor		
			Electro-osmosis, Hard Schulze rule, Protective Colloids and Gold Number		

### 35. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral  
70% exam,  
30% daily oral

### 36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Articles, books and websites
Recommended books and references (scientific journals, reports...)	Physical Chemistry P.W Atkins 9th ed. page 892.  Introduction to Colloid and Surface Chemistry. (Elsevier, 1992). doi:10.1016/C2009-0-24070-0.  Birdi, K. S. Surface and Colloid Chemistry. (CRC Press, 2009). doi:10.1201/b10154.
Electronic References, Websites	As bellow

<http://www.smartway2study.com/2016/03/salient-features-of-miller-indices-of.html>

<https://www.slideshare.net/ErPrabhakar1/miller-indices-for-crystallography-planes>

<https://www.kruss.de/services/education-theory/glossary/youngs-equation/>

<https://www.emedicalprep.com/study-material/chemistry/surface-chemistry/adsorption/>

<http://www.chemistrylearning.com/adsorption/#prettyPhoto>

Recommendations: Reporting Physisorption Data for Gas/Solid Systems with Special Reference to the Determination of Surface Area and Porosity, IUPAC Commission on Colloid and Surface

Chemistry Including Catalysis, Pure Appl. Chem., 57 \_1985. 603; Recommendations for the Characterization of Porous Solids, IUPAC Commission on Colloid and Surface Chemistry, Pure

Appl. Chem., 66 \_1994. 1739.

<http://www.microtrac-bel.com/en/tech/bel/seminar02.html>

# المرحلة الرابعة

## Course Description Form

<b>37. Course Name:</b>	
Biochemistry	
<b>38. Course Code:</b>	
404CHBC2	
<b>39. Semester / Year:</b>	
Year	
<b>40. Description Preparation Date:</b>	
20/ 4/ 2024	
<b>41. Available Attendance Forms:</b>	
Weekly / obligatory(mandatory)	
<b>42. Number of Credit Hours (Total) / Number of Units (Total)</b>	
150 hours	
<b>43. Course administrator's name (mention all, if more than one name)</b>	
Name: Assist. Prof. Khalid Shaalan Sahab Email: <a href="mailto:Khalidshalaan@yahoo.com">Khalidshalaan@yahoo.com</a>	
<b>44. Course Objectives</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>- Define the metabolism and its importance</li> <li>- Biosynthesis of molecules of cells</li> <li>- Catabolism of dietary molecules to liberate the energy</li> <li>- Define the fates of molecules (clinical importance) that are produced from metabolism</li> <li>- Knowledge of the chemistry of blood</li> <li>- Define the determination methods used to estimate blood molecules and their applications</li> <li>- Teaching and learning the students any essential and necessary information related to biochemistry.</li> </ul>
<b>45. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<ul style="list-style-type: none"> <li>- Lecture method and use of interactive whiteboard with explanation and clarification</li> <li>- Provide students with the basics and additional topics related to the outcomes of thinking and biochemical analysis</li> <li>- Homework that requires subjective explanations in causal ways</li> </ul>

## 46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introduce biochemical processes to students	Introduction to metabolism	Board and interactive whiteboard	- Daily exams - Homework - Monthly exams
2	5	Digestion and absorption of dietary carbohydrate	Nutrition / Digestion and absorption of dietary carbohydrate	=	=
3	5	-Fate of absorbed glucose/ -glycolysis and formation of pyruvate	Catabolism of glucose	=	=
4	5	Conversion of pyruvate to acetyl-CoA/ Krebs cycle	Explain Krebs cycle	=	=
5	5	Energy calculation from catabolism of glucose, Conversion of pyruvate to lactate and Cori cycle	Energy liberated from catabolism of glucose/ Cori cycle	=	=
6	5	Glycogenesis and glycogenolysis	Glycogenesis and glycogenolysis	=	=
7	5	-Gluconeogenesis -pentose phosphate pathway	Gluconeogenesis and pentose phosphate pathway	=	=
8		First exam of first course			
9	5	Digestion and absorption of dietary lipids Beta-oxidation of fatty acids	Nutrition / Digestion and absorption of dietary lipids Beta-oxidation of fatty acids	=	=
10	5	Energy from oxidation of fatty acids Fatty acids Biosynthesis	Energy from oxidation of fatty acids Fatty acids Biosynthesis	=	=
11	5	Biosynthesis of Triglycerides and phospholipids	Biosynthesis of Triacylglycerol and phospholipids	=	=
12	5	Biosynthesis of cholesterol Ketone bodies	Biosynthesis of cholesterol Ketone bodies	=	=
13	5	Nutrition / Digestion and absorption of dietary proteins/ State of oxidation of amino acids	-absorption of dietary proteins/ -Oxidative-degradation State of amino acids	=	=
14	5	Transformation of amino group in liver	Transformation of amino group in liver	=	=

15	5	Glutamine transfer amino from extra-hepatic cells to liver	Glutamine transfer of amino group via blood to liver	=	=
16	5	Alanine transfer amino group from muscles to liver	alanine transfer amino via blood to liver	=	=
17	5	Second exam of first course			
18	5	Excretion methods of nitrogen and urea cycle		=	=
19	5	Urea cycle and Krebs cycle	Krebs bicycles/ aspartate-argininosuccinate shunt	=	=
20	5	Genetic defects of urea cycle enzymes	Genetic defects of urea cycle enzymes	=	=
21	5	Metabolism of nucleotides/ anabolism of purine nucleotides	Metabolism of nucleotides	=	=
22	5	Anabolism of pyrimidine nucleotides Catabolism of nucleotides	Metabolism of nucleotides	=	=
23	5	Replication and transcription of DNA	Replication, transcription and translation of genetic information	=	=
24	5	Translation of genetic information and biosynthesis of proteins	Replication, transcription and translation of genetic information	=	=
25	5	First exam of second course			
26	5	Constituents of blood/ Blood proteins and its biological role	Blood chemistry	=	=
27	5	Red and white blood cells and its biological role	Blood chemistry	=	=
28	5	Human nutrition	Human nutrition	=	=
29	5	Human nutrition	Human nutrition	=	=
30	5	Second exam of second course			

#### 47. Course Evaluation

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

#### 48. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

- 1- **Harpers Illustrated Biochemistry,**
- 2- **Principle of Bio Chemistry, Smith & White**
- 3- **Biochemistry by Armstrong**
- 4- **Lehninger Principle of Bio Chemistry**

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

## Course Description Form

<b>1. Course Name:</b>					
Quantum and spectra					
<b>2. Course Code:</b>					
402CHQS					
<b>3. Semester / Year:</b>					
Year					
<b>4. Description Preparation Date:</b>					
1 October 2023					
<b>5. Available Attendance Forms:</b>					
Weekly					
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>					
90 hours / 6 units					
<b>7. Course administrator's name (mention all, if more than one name)</b>					
Name: Zaid Hameed Mahmoud Email: zaidhamid@uodiyala.edu.iq					
<b>8. Course Objectives</b>					
<b>Course Objectives</b>			Introduce the students quantum chemistry and its applications, as well as, the the application of molecular spectrums		
<b>9. Teaching and Learning Strategies</b>					
<b>Strategy</b>		Lecture method and using data show Explanation and clarification			
<b>10. Course Structure</b>					
<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject</b>	<b>Learning method</b>	<b>Evaluation method</b>

			name		
1	3	Theoretical to introduction quantum chemistry, and introduction to mathematics		Data show an expansion	Reports and homework
2	3	Classical an mechanics Newton laws		=	=
3	3	Harmonic Oscillator by spheric coordinates		=	=
4	3	Wave, particles, dual nature of light, Heisenberg uncertainty		=	=
5	3	Black body radiation and photoelectric effect		=	=
6	3	Bohr Rutherford theory		=	=
7	3	Spectral lines of atoms		=	=
8	3	Particle in a box problem		=	=
9	3	Schrödinger equation and wave function		=	=
10	3	Principles and postulates of Quantum mechanics		=	=
11	3	Applications of Schrödinger equation		=	=
12	3	Angular momentum and Hydrog atom		=	=
13	3	Degeneration of energy states		=	=
14	3	Atomic structure and periodic la		=	=
15	3	Rigid Rotor		=	=
16	3	Molecular orbital theory		=	=
17	3	Ground and excited states and molecular spectroscopy		=	=
18	3	Rotation spectra, moment of inertia Molecules classifying		=	=
19	3	Degree of freedom and types of vibrations		=	=
20	3	Rotational spectra, theory and applications		=	=
21	3	Type of electronic transition		=	=
22	3	Selection rules		=	=
23	3	Electronic absorption spectra		=	=
24	3	Fluorescence and Phosphorescence		=	=
25	3	Electronic spectra in polyaroma molecules		=	=
26	3	Franck codon transition		=	=
27	3	Intensity distribution within the band		=	=
28	3	vibrational structure of electron		=	=

		bands in diatomic molecules			
29	3	Theory of rotation and rotational vibration spectra		=	=
30	3	Nuclear spin resonance, theory and practice		=	=

### 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)	P.W. Atkins, Physical Chemistry, C.N. Banwell, Fundamental of Molecular Spectroscopy
Main references (sources)	Lecture notes of MIT
Recommended books and references (scientific journals, reports...)	Quantum Mechanics and Spectroscopy I and II by J. E. Parke
Electronic References, Websites	

## Course Description Form

13.	<b>Course Name:</b>	
		Industrial Chemistry
14.	<b>Course Code:</b>	
		<b>Industrial Chemistry/403CHIC2</b>
15.	<b>Semester / Year:</b>	
		Year
16.	<b>Description Preparation Date:</b>	
		5-5-2024
17.	<b>Available Attendance Forms:</b>	
		Regularity.
18.	<b>Number of Credit Hours (Total) / Number of Units (Total)</b>	
		60 hours
19.	<b>Course administrator's name (mention all, if more than one name)</b>	
		Name: Abdlwahhab Hameed Majeed Email: <a href="mailto:abdulwahhab@uodiyala.edu.iq">abdulwahhab@uodiyala.edu.iq</a> Name: Omar Ghazi Hamoodi Email: <a href="mailto:omerkazi@uodiyala.edu.iq">omerkazi@uodiyala.edu.iq</a>
20.	<b>Course Objectives</b>	
	<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>Enabling students to understand the principles and concepts of industrial chemistry.</li> <li>Training students on the characterization of polymeric compounds using modern instrumentation.</li> <li>Explaining the theoretical principles underlying the measurement of molecular weight for various polymers.</li> <li>Clarifying petrochemical industries, their chemical formulations, components, and applications.</li> <li>Providing university-level students with theoretical and applied knowledge to enhance their understanding and critical thinking skills.</li> <li>Identifying various industries, their manufacturing processes, and the significant role of chemistry in industry, as well as utilizing them as a foundation for further study in chemistry to develop</li> </ul>

21. Teaching and Learning Strategies					
Strategy	1. Explanation and Clarification 2. Lecture Method 3. Presentation of Models				
22. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to the chemistry of polymers and the degree of polymerization and how to calculate it	Polymer Chemistry	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
2	2	Introduce the student to the classification of polymers and know the types of each class	classification of polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
3	2	Definition of the student naming polymers	nomenclature of polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
4	2	Factors affecting polymers	Factors affecting polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
5	2	Types of Molecular Weight of Polymers, Molecular Weight Diffusion Rate of Polymers	Molecular weight of polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
6	2	The most important types of reactions leading to the formation of condensing polymers, controlling the molecular weight of condensing polymers	condensation polymerization	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
7	2	The most important types of reactions leading to the formation of condensing polymers, controlling the molecular weight of condensing polymers	Condensation polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams

8	2	The most important types of condensing polymers: Polyesters, polyamides, polyurea, polyurethane, copolymers	Industrial condensing polymers	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
9	2	The first month exam	is a theoretical exam in the previous article mentioned above		
10	2	Ionic polymerization and its types, its importance, the difference between condensation and addition polymerization	addition polymerization	blackboard + PowerPoint+ data show	
11	2	Types of addition polymerization, free radical polymerization, its mechanisms, initiators , the most important polymers that exhibit this type of polymerization	negative ionic addition polymerization	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
12	2	Ionic addition polymerization, types, anionic ionic addition polymerization, its initiations, polymerization mechanism, the most important polymers that exhibit this mechanism	Anionic addition polymerization	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
13	2	Cationic addition polymerization, its precursors, the polymerization mechanism, the most important polymers that exhibit this mechanism	Cationic addition polymerization	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
14	2	The most important factors affecting on the ionic addition polymerization, temperature, polarity of the solvent, type of monomer, nature of the polymeric chain, live	Ionic addition and coordination polymerization	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams

		polymerization			
15	2	Different polymerization processes and conditions	Polymerization processes and conditions	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
16	2	The second month exam	is a theoretical exam in the previous article mentioned above		
17	2	Teaching the student the chemistry of oil, the beginning of the emergence of oil, the most important theories that explain the emergence of oil	Chemistry of petroleum	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
18	2	The most important hydrocarbon and non-hydrocarbon components and the percentage of their presence in crude oil	Chemical composition of crude oil	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
19	2	Classification of crude oil in relation to its basis, the most important general characteristics of crude oil	Crude oil basics	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
20	2	Characteristics of oil derivatives, their importance and the extent to which they are related to different oil products	Characteristics of petroleum products	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
21	2	Crude oil treatment and re-refining, separation of water and salts, separation of emulsions, separation of gases, physical processes: distillation and its types, extraction with solvents, absorption and stripping, thermal diffusion,	Crude oil processing and re-refining	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
22	2	Chemical processes in oil refining, thermal cracking, thermal catalytic cracking, catalytic alkylation	Chemical processes in oil refining	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
23	2	Catalytic structural transformation	Chemical processes in oil refining	blackboard + PowerPoint+ data	Daily exams and homework +

		processes and their types, catalytic isomerization processes, catalytic polymerization processes		show	monthly exams
24	2	The third month exam	is a theoretical exam in the previous article mentioned above		
25	2	Treatment and purification processes, impurities to be removed, treatment with sulfuric acid, removal of mercaptans	Processing and purification	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
26	2	Treatment and purification processes, treatment with clay, treatment with molecular sieves, desalination, treatment with hydrogen gas and its types	Processing and purification	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
27	2	The most important oil derivatives (an overview), natural gas, its types, methods of separation and its importance, gasoline and its composition, natural gasoline, automotive gasoline and its importance, improving the quality of gasoline.	Petroleum products	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
28	2	Kerosene and its importance, lighting and heating kerosene, engine and aircraft kerosene, aircraft kerosene and its types, gas oil (diesel fuel), fuel oils, lubricating oils and their types, oil greases, their composition and importance	Petroleum products	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
29	2	Petroleum wax, petroleum asphalt,	Petroleum products	blackboard + PowerPoint+ data	Daily exams and homework +

		petroleum solvents or naphtha		show	monthly exams
30	2	The forth month exam	is a theoretical exam in the previous article mentioned above		

### 23. Course Evaluation

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

### 24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Polymer Chemistry (Koltzenburg, Sebastian, Maskos, Michael, Nuyken, Oskar) The Chemistry and Technology of Petroleum (James G. Speight)
Main references (sources)	Introduction to Polymer Chemistry (Charles E. Carraher Jr.) Petroleum Chemistry (Mohamed Sikkander)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<a href="https://www.goodreads.com/book/show/13898.The_Chemistry_And_Technology_Of_Petroleum">https://www.goodreads.com/book/show/13898.The_Chemistry_And_Technology_Of_Petroleum</a> <a href="https://www.kobo.com/gr/en/ebook/textbook-of-polymer-chemistry">https://www.kobo.com/gr/en/ebook/textbook-of-polymer-chemistry</a>

## Course Description Form

<b>25. Course Name:</b>					
Instrumental Analysis					
<b>26. Course Code:</b>					
405CHIA					
<b>27. Semester / Year:</b>					
Year					
<b>28. Description Preparation Date:</b>					
21-4-2024					
<b>29. Available Attendance Forms:</b>					
Regularity.					
<b>30. Number of Credit Hours (Total) / Number of Units (Total)</b>					
150 hours					
<b>31. Course administrator's name (mention all, if more than one name)</b>					
<b><u>Name:</u> Lecturer Sahar Raihan Fadhel</b> saharraihan@uodiyala.edu.iq					
<b>32. Course Objectives</b>					
<b>Course Objectives</b>	Teaching the student the scientific and theoretical concept of the foundations of automated analysis, what are the most important methods used in automated analysis, how to use advanced automated laboratory Instrumentation in completing analysis, the mechanics of the work of these Instrumentation, their most important components, the most important areas of application, and keeping pace with the scientific development of Instrumental Analysis. Teaching and educating students on all the necessary and necessary information for the subject of instrumental analysis, which qualifies them to work and research in all areas of analytical and research chemistry				
<b>33. Teaching and Learning Strategies</b>					
<b>Strategy</b>	<ul style="list-style-type: none"> <li>4. Explanation and Clarification</li> <li>5. Lecture Method</li> <li>6. Presentation of Models</li> </ul>				
<b>34. Course Structure</b>					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introduce the student to Definition of electromagnetic	Spectrum regions, the effect of	Lecture and discussion	Daily exams Homework Monthly exams

		radiation	electromagnetic radiation with matter, absorption and emission of radiation by atoms and molecules		
2	5	Introduce the student to spectroscopic methods	Spectral methods and their types and the interaction of the spectrum with matter	Lecture and discussion	Daily exams Homework Monthly exams
3	5	Introducing the student to the methods of analysis by molecular spectra UV- VIS	analysis by Ultraviolet - Visible Spectrophotometry	Lecture and discussion	Daily exams Homework Monthly exams
4	5	Introducing the student to the methods of analysis by molecular spectra UV- VIS	Instrumentation used in Spectrophotometry analysis of the ultraviolet and visible region	Lecture and discussion	Daily exams Homework Monthly exams
5	5	Introducing the student to the methods of analysis by molecular spectra VIS UV-	The most important applications of molecular Spectrophotometry VIS UV-	Lecture and discussion	Daily exams Homework Monthly exams
6	5	Introduce the student to analysis with infrared spectroscopy	Chemical analysis using Infrared spectroscopy	Lecture and discussion	Daily exams Homework Monthly exams
7	5	Introduce the student to analysis with infrared spectroscopy	The most important Instrumentation used in spectroscopy using infrared, its components and applications	Lecture and discussion	Daily exams Homework Monthly exams
8	5	Introduce the student to methods	The phenomenon of fluoridation and	Lecture and discussion	Daily exams Homework Monthly exams

		fluorescence and phosphorylation	phosphorylation and the most important principles and how it occurs		
9	5	Introduce student to the methods of scattering and turbidity	Analysis using the phenomenon of light scattering and turbidity and its applications	Lecture and discussion	Daily exams Homework Monthly exams
10	5	Introduce student to the analysis by atomic absorption spectrophotometry	Analysis using atomic absorption spectrophotometry	Lecture and discussion	Daily exams Homework Monthly exams
11	5	Introduce student to the analysis by atomic absorption spectrophotometry	Atomic absorption Instrumentation and their components and applications of atomic absorption	Lecture and discussion	Daily exams Homework Monthly exams
12	5	Introduce student to the analysis by atomic emission spectroscopy	Analysis using atomic emission spectroscopy	Lecture and discussion	Daily exams Homework Monthly exams
13	5	Introduce student to the analysis by atomic emission spectroscopy	Atomic emission Instrumentation and their components and applications of atomic emission	Lecture and discussion	Daily exams Homework Monthly exams
14	5	Introduce student to analysis by using X-ray technique	X-rays, theoretical foundations, Instrumentation, how to Analysis and applications	Lecture and discussion	Daily exams Homework Monthly exams
15	5	Introduce the	CHN technique,		Daily exams

		student to analysis using the CHN technique	theoretical foundations, Instrumentation, how to Analysis and applications		Homework Monthly exams
16	5	first exam			
17	5	Introduce the student to Analysis by Electrochemical Methods	Electrochemical Methods and cell types	Lecture and discussion	Daily exams Homework Monthly exams
18	5	Introduce the student to Analysis by Electrochemical Methods	Potentiometric measurements, potentiometric titrations and types of electrodes	Lecture and discussion	Daily exams Homework Monthly exams
19	5	Introducing student to methods of Voltammetry. Polarography and Amperometric Titrations	Analysis using the voltammetry, polarography and Polarography wave techniques and Instrumentation	Lecture and discussion	Daily exams Homework Monthly exams
20	5	Introducing student to methods of Voltammetry. Polarography and Amperometric Titrations	Amperometric Titrations and applications	Lecture and discussion	Daily exams Homework Monthly exams
21	5	Introduce student to Electrodeposition and coulometric Methods	Analysis using Electrodeposition and coulometric technique, theoretical foundations, Instrumentation and applications	Lecture and discussion	Daily exams Homework Monthly exams
22	5	Introduce student to Conductometry	Analysis using Conductometry, theoretical foundations,	Lecture and discussion	Daily exams Homework Monthly exams

			Instrumentation and applications		
23	5	Introduce the student to the methods of thermal analysis	Thermal analysis methods and their applications	Lecture and discussion	Daily exams Homework Monthly exams
24	5	Introduce the student to the methods of thermal analysis	Thermal analysis and curves	Lecture and discussion	Daily exams Homework Monthly exams
25	5	Introduce students to chromatography techniques	Theoretical foundations of chromatography, types of chromatography and applications	Lecture and discussion	Daily exams Homework Monthly exams
26	5	Introducing student to chromatography technique	Theoretical foundations of gas chromatography and how to analysis	Lecture and discussion	Daily exams Homework Monthly exams
27	5	Introducing student to chromatography technique	Instrumentation and its components and applications	Lecture and discussion	Daily exams Homework Monthly exams
28	5	Introducing student to high performance liquid chromatography technology technique	Theoretical foundations of high-performance liquid chromatography and how to analysis	Lecture and discussion	Daily exams Homework Monthly exams
29	5	Introducing student to high performance liquid chromatography technology technique	Instrumentation and its components and applications	Lecture and discussion	Daily exams Homework Monthly exams
30	5	Second 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)	Principles of Instrumental Analysis , Douglas A. Skoog , James Holler, Stanley R. Crouch,"7th" Edition , 2007.
Main references (sources)	<p>1- Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M. West , Eight Edition, 2004.</p> <p>2- Analytical Chemistry, Gary Christian Sixth Edition</p> <p>3- Chemical Analysis, Modern Instrumentation Methods and Techniques, Francis Rouessac and Annick Rouessac Second Edition</p> <p>4- Modern Analytical Chemistry, David Harvey , Mc Graq Hill Company, 2000.</p>
Recommended books and references (scientific journals, reports...)	<a href="http://www.chemicalprocessing.com">www.chemicalprocessing.com</a>
Electronic References, Websites	<a href="http://www.bytoco.com">www.bytoco.com</a>

## Course Description Form

<b>23. Course Name:</b>					
Hormones					
<b>24. Course Code:</b>					
407CHH					
<b>25. Semester / Year:</b>					
Firs t semester/2024					
<b>26. Description Preparation Date:</b>					
1/04/2024					
<b>27. Available Attendance Forms:</b>					
Weekly/ mandatory					
<b>28. Number of Credit Hours (Total) / Number of Units (Total)</b>					
30 Hours / 2 units					
<b>29. Course administrator's name (mention all, if more than one name)</b>					
Name: Dr. Najwa Jameel Hameed Email: dr.najwajameel@gmail.com					
<b>30. Course Objectives</b>					
<b>Course Objectives</b>		<ul style="list-style-type: none"> <li>• Giving to students condensed information about hormones....</li> <li>• Hormones disorders and relate medical conditions....</li> <li>• .....</li> </ul>			
<b>31. Teaching and Learning Strategies</b>					
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Lectures using data show</li> <li>• Oral explanation</li> <li>• Illustration using white board and animated vedios</li> </ul>				
<b>32. Course Structure</b>					
<b>Week</b>	<b>Hours</b>	<b>Required</b>	<b>Unit or subject name</b>	<b>Learning</b>	<b>Evaluation</b>

		<b>Learning Outcomes</b>		<b>method</b>	<b>method</b>

1	2	Learning about Hormones world	Hormones , hormones importance,	Data board	show, write	Quiz,reports, arguments
2	2	How hormones work	Hormones characteristics mechanisms of function	Data board	show, write	Quiz,reports, arguments
3	2	How hormones work molecular level	The Mechanisms of first messenger	Data board	show, write	Quiz,reports, arguments
4	2	How hormones work molecular level	The Mechanisms of second messenger	Data board	show, write	Quiz,reports, arguments
5	2	Hormones receptors	Hormones Receptor regulation Hormonal regulation	Data board	show, write	Quiz,reports, arguments
6	2	Endocrine system	Endocrine system, endocrine glands	Data board	show, write	Quiz,reports, arguments
7	2	Endocrine system	Hypothalamus anterior pituitary gland stimuli for hormone secretion	Data board	show, write	Quiz,reports, arguments
8	2	Endocrine system	Hypothalamic pituitary disorders	Data board	show, write	Quiz,reports, arguments

9	2	Endocrine system	HPT axis, stimulus, secretion	Data show, board	Quiz,reports, arguments
10	2	Endocrine system	HPT axis, stimulus and secretion	Data show, board	Quiz,reports, arguments
11	2	Endocrine system	HPT disorder	Data show, board	Quiz,reports, arguments
12	2	Endocrine system	HPA axis, stimulus, secretion	Data show, board	Quiz,reports, arguments
13	2	Endocrine disease	HPA disorders diseases	Data show, board	Quiz,reports, arguments
14	2	Hormones as drugs	Hormones application as drugs	Data show, board	Quiz,reports, arguments
15	2	Examination	Examination		

### 33. 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

### 34. Learning and Teaching Resources

Required textbooks (curricular books, if any)

- Hormones by Anthony Norman, Gerald Litwack
- Hormones and the Endocrine System

	o
Main references (sources)	Above mentioned
Recommended books and references (scientific journals, reports...)	Above mentioned are enough
Electronic References, Websites	Wikipedia

### Course Description Form

49. Course Name:	
<b>Spectral Identification</b>	
50. Course Code:	
<b>406CHSI</b>	
51. Semester / Year:	
Year	
52. Description Preparation Date:	
1/10/2023	
53. Available Attendance Forms:	
Regularity.	
54. Number of Credit Hours (Total) / Number of Units (Total)	
90 hours	
55. Course administrator's name (mention all, if more than one name)	
Name: Safaa Abdulhameed Dadoosh	
Email: <a href="mailto:safaabdulhameed@uodiyala.edu.iq">safaabdulhameed@uodiyala.edu.iq</a>	
56. Course Objectives	
<b>Course Objectives</b>	Studying the spectroscopic diagnosis of organic compounds and teaching students all the necessary information related to the subject of spectroscopic diagnosis to know the structural structure of organic compounds, which qualifies them to work and research in all fields of spectroscopic diagnosis of organic compounds. <ul style="list-style-type: none"> <li>• Giving an idea about the structural structure and stereomorphology of organic compounds using nuclear magnetic resonance (NMR) spectroscopy and knowing the main functional groups using infrared spectroscopy, in addition to knowing the wavelengths of organic compounds using ultraviolet radiation.</li> </ul>
57. Teaching and Learning Strategies	
<b>Strategy</b>	Power point lecture method using data show and interactive whiteboard. <ol style="list-style-type: none"> <li>7. - Explanation and clarification.</li> <li>8. - Providing students with the basics and additional topics related to the outcomes of thinking and chemical spectroscopic diagnosis of organic</li> </ol>

	<p>compounds.</p> <p>9. - Forming discussion groups during lectures to discuss organic chemistry topics that require thinking and analysis.</p> <p>10. Asking students a set of thinking questions during lectures, such as what, how, when, and why for specific topics.</p> <p>11. Giving students homework that requires self-explanation in causal ways.</p>
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### 58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	An introductory introduction to areas of electromagnetic radiation	Microwave and radio radiation - infrared radiation - visible radiation - ultraviolet radiation - X-rays - cosmic rays	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
2	3	Definition of ultraviolet radiation and its sources	The sun - stars and planets	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
3	3	Addressing Berlamert's law	Equations and derivations	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
4	3	Identify electronic transfers in organic molecules	Synergistic, non-synergistic, and anti-synergistic bonds	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
5	3	Explanation and clarification of the synergistic, non-synergistic, and anti-associative bonds	Synergistic, non-synergistic, and anti-synergistic bonds	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
6	3	Identify the Woodward-Fiser rule to calculate the wavelength of dienes	Calculate the wavelength of dienes	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
7	3	Factors affecting the positions of beams in the UV spectrum	The effect of succession - the effect of steric obstruction - the effect of the solvent	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
8	3	The first month exam			
9	3	Solvent irritation at wavelength	Properties of solvents used in UV spectroscopy (polar and nonpolar solvents)	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
10	3	The effect of compensated aggregates on wavelength	Pulling compensated aggregates and pushing compensated aggregates	blackboard + PowerPoint+ data show	Daily exams and homework + monthly
11	3	Identify infrared spectroscopy and its regions	Far, near and medium infrared	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams

12	3	Discussing the types of molecular vibrations	Stretching vibrations and bending vibrations	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
13	3	Factors affecting the vibration of bonds	Bond elasticity - relative mass - hybridization - resonance	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
14	3	Identify the main adsorbents of functional groups of alkanes, alkenes, and alkynes	Saturated and unsaturated hydrocarbons	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
15	3	The second month exam			
16	3	Identify the main absorptions of functional groups of alcohols, phenols, amines and aromatic compounds.	Hydroxyl group - amine group - double bond	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
17	3	Factors affecting double joint stretching vibrations	Cascade effect - the effect of ring size	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
18	3	Factors that affect the stretching vibration of the (C=O) group.	The effect of hydrogen bonding - compensation in the carbon atom ( $\alpha$ ) - the effect of succession - the effect of the ring size	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
19	3	Discuss a number of infrared spectra of different organic compounds	Students participate in discussion and solutions	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
20	3	Examples and solutions for functional groups of various organic compounds	Students participate in discussion and solutions	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
21	3	The origin of the phenomenon of nuclear magnetic resonance	Nuclear magnetic resonance phenomenon	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
22	3	Proton nuclear spin states	Rotation towards the magnetic field and rotation against the direction of the magnetic field	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
23	3	How to obtain an NMR spectrum	NMR spectroscopy	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
24	3	Identify the NMR device and how to process the model	One proton-carbon 13- How to prepare the model	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
25	3	The third month exam			
26	3	Study of the effect	The effect of blocking	blackboard +	Daily exams and

		of blocking and chemical displacement	and the effect of lifting the block	PowerPoint+ data show	homework + monthly exams
27	3	Chemical displacement and factors affecting their locations	Blocking - electronegativity - pulling groups - driving groups	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
28	3	Solvents used in NMR spectra and their locations	The basic solvents used, their characteristics and locations on the spectrum	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
29	3	Types of nuclear fission in the nuclear magnetic resonance spectrum	Single, binary, triple, quadruple, and five-fold fissions	blackboard + PowerPoint+ data show	Daily exams and homework + monthly exams
30	3	The forth month exam			

### 59. Course Evaluation

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

### 60. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Spectrometric Identification of Organic Compounds. by Robert M. Silverstein, Francis X.
Main references (sources)	Identification of Organic . Silverstein and Bassler - - Infrared spectroscopy fundamental and application by Barbara Stuart , 2004
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<p><a href="https://www.wiley.com/en-us/Spectral+and+Chemical+Characterization+of+Organic+Compounds%3A+A+Laboratory+Handbook%2C+3rd+Edition-p-9780471927150">https://www.wiley.com/en-us/Spectral+and+Chemical+Characterization+of+Organic+Compounds%3A+A+Laboratory+Handbook%2C+3rd+Edition-p-9780471927150</a></p> <p><a href="https://www.amazon.in/Stereochemistry-Organic-Compounds-Principles-Applications/dp/0470216395">https://www.amazon.in/Stereochemistry-Organic-Compounds-Principles-Applications/dp/0470216395</a></p>