



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



**Academic Program Description Form for Colleges and  
Institutes  
For the academic year**

**University: Wasit University**

**College/Institute: College of Science**

**Scientific Department: Department of Chemistry Sciences**

**File Fill Date:**

**Signature:**

**Name of Head of Department: Dr. Ammar Farman  
Abbood**

**Date:**

**Signature:**

**Asst. Scientific Name: Dr. Faiq Jamil Hassan**

**Date:**

**The file was audited by:**

**Division of Quality Assurance and University Performance**

**Name of Division of Quality Assurance and University Performance: Dr. Hussein Taqi Joon**

**Date: / /**

**Signature:**

**Approval of Dean**

**Academic Program Description - Department of Chemistry Sciences**

This academic program description provides a summary of the most important characteristics of the program and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the opportunities available. It is accompanied by a description of each course within the program

<b>1. Educational Institution</b>	University of Wasit - College of Science
<b>2. Scientific Department/ Center</b>	Department of Chemistry Sciences
<b>3. Name of academic or professional program</b>	Bachelor of Science in Chemistry
<b>4. Name of the final certificate</b>	Bachelor
<b>5. School System: Annual /Courses/Other</b>	Quarterly/ annual for the second, third and fourth years, while the first year is teaching according to (Bologna System)
<b>6. Approved Accreditation Program</b>	None
<b>7. Other external influences</b>	<ol style="list-style-type: none"> <li>1. Scientific research related to the department's specialization.</li> <li>2. World Wide Web (Internet)</li> <li>3. Normal and digital libraries.</li> <li>4. Data Show</li> <li>5. Power point</li> </ol>
<b>8. Date the description was prepared</b>	
<b>9. Academic Program Objectives</b>	
1. Teaching the basics of chemistry as a science that researches the study of chemical compounds and the discovery of new compounds with various properties and applications that contribute mainly to the development of industry and technology.	
2. Dealing on the basis of quotation and then learning with the aim of developing the intellectual ability of the student.	
3. Developing the student's ability to collect and apply information.	

4. Encouraging scientific research and improving students' discussion skills
5. Developing the creative and intellectual skills of the students of the department to enable them to deal in a scientific manner in making decisions related to their specialization or to enable them to succeed in facing work problems.

## 10. Required Program Outputs and Teaching, Learning and Evaluation Modalities

### A- Knowledge Objectives

- A1-The student should be familiar with the basics of chemistry.  
 A2-The program aims to raise the possibility of the student to the level of understanding in the field of chemistry as far as his specialization is concerned.  
 A3- Developing the student's cognitive abilities and raising them

### B- Program Skills Objectives:

- B1- Teaching the student how to become able to think logically.  
 B2- Teaching the student to analyze and employ the prescribed curriculum vocabulary.  
 B3- Developing the mental and subjective ability of the student in the specialization is an important part in his field of specialization  
 B4-Providing the student with communication skills and using modern teaching techniques effectively.

### Teaching and learning methods

1. Lectures
2. Asking questions and opening the door for dialogue.
3. Computer-supported teaching and presentation of the subject in data show.
4. Assigning the student to write some research papers
5. Participation in conferences and scientific trips

### Evaluation methods

1. Daily, monthly tests.
2. Scientific Research
3. Conducting seminars for students to find out the extent of their understanding of the subject.

**C- Emotional and value objectives:**

- C1- Asking questions that require answers within short periods of time  
 C2- Develop and support discussions within the classroom

**Teaching and learning methods**

Providing an appropriate educational climate for logical thinking through continuous guidance of students by professors during the lectures meeting, opening the door for open and direct discussions with students

**Evaluation methods****(d) Transferred general and qualifying skills (other skills related to employability and personal development).**

D1- Basic communication skills through (sports activities, educational guidance, college conferences, department seminars, seminars to discuss student research)

D2- Teaching the student how to develop and develop creative and innovative thinking skills in the field of specialization

**Teaching and learning methods**

Curriculum, use of the Internet, use of data show, use of power point

**Evaluation methods**

1. Preparing working papers and research papers graduating to the final stage.
2. Oral, monthly and daily exams

**11. Program Structure**

Academic year: First First course	Theoretical	Practical	Units
Inorganic chemistry	3	---	3
Analytical Chemistry	2	3	3
Arabic language	2	---	2
Human rights	2	---	2
Cell	2	3	2
<b>TOTAL UNITS</b>		<b>30</b>	

<b>Academic year: Second First course</b>	<b>Theoretical</b>	<b>Practical</b>	<b>Units</b>
Inorganic chemistry	3	---	3
Analytical Chemistry	2	3	3
General physics	2	2	3
Mathematics	2	---	2
English	2	---	2
Computers	---	2	1
<b>TOTAL UNITS</b>	<b>30 ECT</b>		

<b>Academic year: First First course</b>	<b>Theoretical</b>	<b>Practical</b>	<b>Units</b>
Inorganic chemistry	2	3	3
Analytical Chemistry	2	3	3
Physical Chemistry	3	3	4
Organic chemistry	3	3	4
Mathematics	2	---	2
English	2	---	2
<b>TOTAL UNITS</b>	<b>18 Units</b>		

<b>Academic year: Third First course</b>	<b>Theoretical</b>	<b>Practical</b>	<b>Units</b>
Organic chemistry	3	3	4
Physical Chemistry	3	3	4
Consistency Chemistry	2	3	3
Biochemistry	2	3	3
Industrial chemistry	2	---	2
English	2	---	2
<b>TOTAL UNITS</b>	<b>18 Units</b>		

<b>Academic year: Fourth Annual system 30 weeks</b>	<b>Applied hours</b>	<b>Units</b>	<b>notes</b>
Automated Analysis Chemistry	6	8	Bachelor degree needs (X) hour (29) h/ week 36 units
Quantum Chemistry and Spectroscopy	3	6	
Biochemistry	5	6	
Industrial chemistry	5	6	
Organic Diagnosis	4	4	
Private	2	2	
Philosophy of Science	2	2	
Graduation Project	2	2	
<b>TOTAL</b>	<b>26 Hours</b>	<b>36 hours</b>	

**Total number of units 145 units**

## **12. Personal Development Planning**

Personal planning is not ink on paper, it is the first process of success, through: setting visions, visualizing goals and programs, working on their implementation, and then continuous evaluation.  
Desire for success and achievement

1. Reaching a certain level of efficiency
2. Achieving a specific goal
3. Acquire new skills

## **13. Admission standard (setting regulations related to admission to the college or institute)**

First: Admission Requirements to the College:

- 1- Adoption of the admission requirements for the student in accordance with the regulations of the Ministry of Higher Education and Scientific Research Central admission
- 2- To successfully pass any special test or personal interview that the College or University Council deems appropriate.
- 3- The document must be required for the specialization to which it is applied.

Second: Conditions for admission to the scientific department:

- 1- Choosing the student's desire from more than one desire arranged according to preference.
- 2- Admission rate in high school.
- 3- The average of the course of the department in which the student wishes to study.
- 4- The absorptive capacity of the scientific department.

## **14. The most important sources of information about the program**

- 1- The curricula of the teaching methods adopted by the University of Wasit.
- 2- Multiple American and British programs such as the University of Iowa, Arkansas, South Carolina, Leeds, Birmingham









## Description of the Academic Program- Phase 1

### Course Description

<b>15. Educational Institution</b>	University of Wasit - College of Science
<b>16. Scientific Department/ Center</b>	Chemistry
<b>17. Course Name / Code</b>	Analytical Chemistry - Phase I
<b>18. Available attendance forms</b>	My presence with online duties (Bologna system)
<b>19. Semester/year</b>	First and second semesters of 2023-2024
<b>20. Number of study hours (total)</b>	5 hours (2 theoretical hours + 3 practical hours)
<b>21. Date this description was prepared</b>	
<b>22. Academic Program Objectives</b>	
1- Introducing the student to the nature of volumetric analytical chemistry and chemical equilibrium	
2- The student should learn the basic principles of analytical chemistry, its sections and the steps of chemical analysis.	
3- The student should learn the skills for solving problems and ideas in this specialization.	
<b>23. Required Program Outputs and Teaching, Learning and Evaluation Modalities</b>	
A- Knowledge Objectives 1-Enabling the student to obtain theoretical knowledge of analytical chemistry 2- The student's knowledge of the basic concepts of chemical analysis methods 3- The student's knowledge of modern methods used in chemical analysis	
B- Program Skills Objectives: 1-The student is proficient in conducting experiments and using devices efficiently 2 - The student master the methods of expressing the concentrations of solutions and the calculations related to them 3- Study of chemical and ionic equilibrium and hydrolysis of salts and regulated solutions 4- Studying the correction curves and the evidence related to them and their applications in theory and practice.	

<b>Teaching and learning methods</b>
<ul style="list-style-type: none"> <li>1- Lectures</li> <li>2- Means of explanations such as: blackboard, ppt presentations</li> <li>3. Use of laboratory materials and measuring devices</li> </ul>
<b>Evaluation methods</b>
<ul style="list-style-type: none"> <li>1- Oral exams</li> <li>2-MonthlyExams</li> <li>3-AnnualExams</li> </ul>
<p>C- Emotional and value objectives:</p> <ul style="list-style-type: none"> <li>1- Adopting the method of dialogue between the student and the teacher</li> <li>2- Preparing structured reports</li> <li>3- Adopting the method of discussion</li> </ul>
<b>Teaching and learning methods</b>
<ul style="list-style-type: none"> <li>1- Lectures</li> <li>2- Means of explanations such as: blackboard, presentations ppt</li> <li>3- Use of laboratory materials and measuring devices</li> </ul>
<b>Evaluation methods</b>
<ul style="list-style-type: none"> <li>1- Oral exams</li> <li>2- Monthly exams</li> <li>3- 3-AnnualExams</li> </ul>

<p>(d) Transferred general and qualifying skills (other skills related to employability and personal development).</p> <ul style="list-style-type: none"> <li>1- The student's ability to work within the educational and professional team</li> <li>2- Positive thinking and the use of the knowledge received</li> <li>3- Ability to deal with entities outside the university and train with them</li> <li>4- The student should be able to learn and master the teaching profession</li> </ul>
<b>Teaching and learning methods</b>
Lecture + Lab
Evaluation methods
<ul style="list-style-type: none"> <li>1- Weekly and monthly exams</li> <li>2- and laboratory reports</li> </ul>

24. Program Structure					
First Semester					
Week	Hours	Intended Learning Outcomes	Module / Course Name or Subject:	teaching method	Valuation Method
1	Practical 3+Theoretical 3	General Introduction Analytical Chemistry, Chemical Analysis Steps	Analytical chemistry, classification, steps of chemical analysis.	Lecture + Lab	Weekly and monthly exams and laboratory reports
2	Practical 3+Theoretical 3	Methods of Expressing Concentrations	Methods of expressions of concentrations	=	=
3	Practical 3+Theoretical 3	Examples and Solutions of Concentrations	Examples and solution of the concentrations	=	=
4	Practical 3+Theoretical 3	Chemical imbalance	Chemical equilibrium, types of chemical equilibrium, mass action law.	=	=
5	Practical 3+Theoretical 3	Factors Affecting Chemical Equilibrium	Factors affecting the reaction equilibrium, solubility of precipices.	=	=
6	Practical 3+Theoretical 3	Solubility quotient	Solubility product principle, examples and applications of solubility product.	=	=
7	Practical 3+Theoretical 3	Ionic equilibrium	Ionization equilibrium, acids and base.	=	=
8	Practical 3+Theoretical 3	Salts and their decomposition	Salts and salts hydrolysis	=	=
9	Practical 3+Theoretical 3	Examples and Applications	Examples and applications	=	=
10	Practical 3+Theoretical 3	Buffer solutions and their types	Buffers solutions, types of buffers solutions.	=	=
11	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
12	Practical 3+Theoretical 3	Volumetric analysis	Volumetric analysis, laws, concentration units used in volumetric calculations.	=	=
13	Practical 3+Theoretical 3	Neutralization Removals	Theory of neutralization titrations of simple system, acid-base	=	=

14	Practical 3+Theoretical 3	Reagents used in Neutralization Removals	Indicators used in neutralization titrations (acid-base), Examples and solutions.	=	=
15	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=

<b>Second Semester</b>					
<b>Week</b>	<b>Hours</b>	<b>Intended Learning Outcomes</b>	<b>Module / Course Name or</b>	<b>teaching method</b>	<b>Valuation Method</b>
<b>1</b>	Practical 3+Theoretical 3	Introduction to Correction Reactions	Introduction to Titration Reactions	Lecture + Lab	Weekly and monthly exams and laboratory reports
<b>2</b>	Practical 3+Theoretical 3	Correction Curve	Titrations curve for weak acid and strong base.	=	=
<b>3</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>4</b>	Practical 3+Theoretical 3	Correction Curve	Titrations curve for weak acid and strong base.	=	=
<b>5</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>6</b>	Practical 3+Theoretical 3	Neutralization Removals	Theory of neutralization titrations of simple system, acid-base	=	=
<b>7</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>8</b>	Practical 3+Theoretical 3	Sedimentation Reactions	Precipitation's reaction, titration curves of Precipitations reaction.	=	=
<b>9</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>10</b>	Practical 3+Theoretical 3	Reagents used in Sedimentation Reactions	Indicators used in Precipitations titration curve.	=	=
<b>11</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>12</b>	Practical 3+Theoretical 3	Oxidation Removals - Shorthand	Oxidation-reduction, titrations, titration curve	=	=

<b>13</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=
<b>14</b>	Practical 3+Theoretical 3	Complexity scans	Complex reaction titrations, titration curves	=	=
<b>15</b>	Practical 3+Theoretical 3	Examples and Solutions	Examples and solutions	=	=

<b>11. Infrastructure</b>	
1- Required prescribed books	Skoog D.: West d. Holler F. and Crouch S. "Fundamental of Analytical Chemistry" eighth Ed. Thomson, USA, 2004. (Fundamental of Analytical Chemistry) - Al-Khafaji, Jawad Kadhim and others, File in practical analytic chemistry.
<b>2- Main References (Sources)</b>	
a. Recommended Books and references (Scientific magazines, reports ...etc.)	- Gray D. Christian "Analytical Chemistry" Sixth Ed. Wiley ed. USA, 2004 - John Kenkel "Analytical Chemistry for Technicians" third ed. Lewis Publishers, USA, 2002. - Vogels" Qualitative Inorganic Analysis" Seventh Edition, Revised by G. Svehla, Longman Group Limited, England 1996. - Wasil, Mohammed Majdi "Experiments in Inorganic, Analytic and Physical Chemistry" Second Ed., Fajr for Publishing and Distribution, 2007.
b. Electronic references, internet sites.	- Daniel C. "Harris, "Quantitative Chemical Analysis" Eighth Ed. Freedom and company New York 2010. -Hage D.: Carr J. "Analytical Chemistry and Quantitative analysis" international Ed. Person, USA, 2011.

1 <sup>st</sup>	2	Introducing the student to analytical chemistry ,and importance	The importance of analytical chemistry	Direct education Paper	Daily exam and discussion
2 <sup>nd</sup>	2	Introducing the student how to prepare solution	Preparation of approximately 0.1N Hcl and 0.1N Sodium carbonat	Direct education paper and practical education	Daily exam and discussion
3 <sup>rd</sup>	2	Introducing the student to the calibration process	Standadization of Hcl with standard solution of Sodium carbonate	Paper lectures and practical education	Daily exam and discussion
4 <sup>th</sup>	2	Introducing the student how to analyzest		Direct education Paper and practical education	Daily exam and discussion
5 <sup>th</sup>	2	Introducing the student to calibration and its types	Analysis of Sodium carbonate	Paper lectures	Daily exam and discussion
6 <sup>th</sup>	2	Introducing the student how to prepare solutions	Introduction Seliwanoff test	lectures and practical application	Daily exam and discussion
7 <sup>th</sup>	2	Introducing the student the calibration process	Preparation of approximately 0.1N Hcl and 0.1N Sodium carbonate	Direct education Paper lectures and practical application	Mid- term exam
8 <sup>th</sup>	2	Introducing the student how to analyze	Standardization of standard solution Hcl with Sodium hydroxide		



9 <sup>th</sup>	2	Student definition of mixture analysis	Analysis of Sodium hydroxide	lectures and practical application Direct education Paper lectures	Daily exam and discussion
10 <sup>th</sup>	2	Student definition mixture analysis	Analysis of mixture (NaOH+Na <sub>2</sub> CO <sub>3</sub> )	Direct education Paper lectures	Daily exam and discussion
11 <sup>th</sup>	2	Student definition of identify the chloride ion	Analysis of mixture NaHCO <sub>3</sub> +Na <sub>2</sub> CO <sub>3</sub> )	Direct education Paper lectures	Daily exam and discussion
12 <sup>th</sup>	2	student definition of reduction calibration	Determination of chloride ion by Mohr method	data show	Scientific discussion
13 <sup>th</sup>	2	Introducing the student to determining the harness of water	Preparation 0.1N Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub> and standardization of KMnO <sub>4</sub> with Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub> then determination the reduction	Direct education Paper lectures	writing a report
14 <sup>th</sup>	2	Reference to the article	Determination of total hardness of water	Discussion	Daily exam and discussion
15 <sup>th</sup>	2	Exam	Hydrolysis of starch by salt	Direct education Paper lectures	Month exam

		presented by the student		
		The importance of carbohydrate		
		Reference to the article		
		Exam		

### 1. Course Evaluation

Distributing the score out of 100 % ( Theoretical lectures + lab works) according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, lab works, reports .... etc

### 2. Learning and Teaching Resources

Required textbooks (methodology, if any)	Practical analytical chemistry book. Dr. Nabil Adel Fakhry Dr. Sermad Bahiat Dijran
Main references (sources)	Practical analytical chemistry book Dr .Hadi kazem Awad. Dr. sajida Abdel Hamid
Recommended books and references (scientific journals, reports...)	<b>Science Magazine</b>
Electronic References, Websites	<a href="https://www.acs.org/careers/chemical-sciences/areas/analytical-chemistry.html">https://www.acs.org/careers/chemical-sciences/areas/analytical-chemistry.html</a>

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Wasit - College of Science
2. Scientific Department/ Center	Department of Chemistry Sciences
3. Course Name / Code	Inorganic Chemistry, Phase I
4. Available attendance forms	In class + electronic assignments (Bologna track)
5. Semester/year	First and second semesters of 2023-2024
6. Number of study hours (total)	3 hours
7. Date this description was prepared	
8. Course Objectives	
<ol style="list-style-type: none"> <li>1. Introduction to the branches of chemistry in general and inorganic chemistry in particular.</li> <li>2. To know the origin of the science of inorganic chemistry and its stages of development.</li> <li>3. Discovering the chemical elements and setting the periodic table of the elements.</li> <li>4. The four theories of quantum mechanics.</li> <li>5. The covalent bonds, their composition and their resulting compounds.</li> <li>6. The covalent bonds, their composition and their resulting compounds.</li> <li>7. Various basic cohesion theories.</li> <li>8. Chemistry of Groups I, II, XIII and XIV.</li> </ol>	

## 9. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

1. Inorganic chemistry
2. The four basic theories of quantum mechanics.
3. Synergy and hybridization theories.
4. Chemistry of groups one, two, thirteen, and four

#### B - Course Skills Objectives

1. To know the origin of the four quantum theories.
2. Discover the electron, proton, and neutron and their respective properties.
3. Hybridization and expected geometry of molecules.
4. Conjugation theories, including (molecular orbital theory, valence bonding theory).
5. Chemistry of the elements of the first four represented aggregates.

#### Teaching and learning methods

1. Using paper lectures.
2. The available means of presentation, for example, the presentation and also the blackboard.
3. Using video for lectures and also for experiments within the curriculum.

#### Evaluation methods

1. Participate in lectures orally (oral examinations).
2. Weekly assignments.
3. Monthly tests.
4. Additional scientific activities.
5. Periodic scientific reports.
6. Adopting the method of scientific discussion.
7. Annual Tests.

#### C- Emotional and value objectives:

1. Adopting the lecture method, scientific questions and answers, and the interaction between the student and the professor
2. Preparing scientific reports on the scientific method

#### Teaching and learning methods

1. Use paper lectures.
2. Available means of illustration, such as the presentation and the blackboard
3. Using video for lectures and also for experiments within the curriculum

#### Evaluation methods

1. Participate in lectures orally (oral examinations).
2. Weekly Assignments.
3. Monthly tests.
4. Additional scientific activities
5. Periodic scientific reports.
6. Adopting the method of scientific discussion.

7. Annual Tests.

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

1. Expanding the student's scientific perceptions and making him engage in university life.
2. Extracting information from more than one scientific source and not relying on one single source.
3. Working in a team spirit and positive scientific cooperation among students.  
How to prepare monthly and final reports for the scientific material

10. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	3	Introduction to inorganic chemistry and the periodic table	Introduction about inorganic chemistry and the periodic table of the elements	Google meet and google class	Homework and test
2	3	Discovery of Corn Components	Atom components	Google meet and google class	Homework and test
3	3	Electron, proton and neutron detection experiments	Electron, proton and neutron discovery	Google meet and google class	Homework and test
4	3	Quantum Mechanics Hypotheses	Postulates of quantum mechanics theory	Google meet and google class	Homework and test
5	3	Quantum Mechanics Hypotheses	Postulates of quantum mechanics theory	Google meet and google class	Homework and test
6	3	Electronic Arrangement	Electronic configuration	Google meet and google class	Homework and test
7	3	Types of chemical bonds	Chemical bonds	Google meet and google class	Homework and test
8	3	Covalent and Ionic Bonding	Covalent and ionic bonds	Google meet and google class	Homework and test
9	3	Covalent and ionic compounds	Covalent and ionic compounds	Google meet and google class	Homework and test
10	3	Electronic blocking	Electronic shielding	Google meet and google class	Homework and test
11	3	Group 1 Chemistry	Group one chemistry	Google meet and google class	Homework and test
12	3	Group 2 Chemistry	Group two chemistry	Google meet and google class	Homework and test
13	3	Chemistry of the thirteenth group	Group thirteen chemistry	Google meet and google class	Homework and test
14	3	group 14	Group fourteen chemistry	Google meet and google class	Homework and test
15	3	group 14	Group fourteen chemistry	Google meet and google class	Homework and test

#### 11. Infrastructure

1- Required textbooks	Inorganic chemistry, Missler and Tarr
2- Key References (Sources)	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
A) Recommended books and references (scientific journals, reports .....	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
B) Electronic references, websites ,.....	Royal Chemical Society

## 12. Course Development Plan

Relying on the latest and updated lectures and scientific content

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

13. Educational Institution	Faculty of Science – University of Wasit
14. University Department/ Center	Chemistry
15. Course Name / Code	General Physics- Phase I/Chemistry Department
16. Available attendance forms	In-Person
17. Semester/year	Academic Year 2023 - -2024 Second Semester
18. Number of study hours (total)	(2) theoretical + (3) practical per week
19. Date this description was prepared	
20. Course Objectives	
<ul style="list-style-type: none"> <li>- Provide learners with knowledge of the principles of general physics and its basics and its relationship to the sciences of chemistry</li> <li>- Developing positive attitudes towards this knowledge</li> <li>- Recognize research methods in physics and correlate their relationships with chemical properties</li> <li>- Identify the basic concepts, trends, quantitative and numerical physical quantities, basic factors in mechanics</li> <li>- Identify the basic trends in the study and prepare students to know the basic idea of studying the physical properties of materials</li> <li>- Identify the objectives of the study of physical analysis of quantities</li> <li>- - Shaping learners' knowledge of the historical development of the science of</li> <li>- Recognize the laws of ideal forces, gas, and heat.</li> <li>- Acquire theoretical knowledge in the field of general laws of physics and laws applicable to solids, liquids and gases.</li> <li>- Identify the consequences of these laws and the extent to which they are used chemically.</li> <li>- Acquiring practical skills by working on experiments in the laboratory and linking laws with existing experiments.</li> </ul>	

21. Learning Outcomes and Teaching, Learning and Evaluation Methods



<p>A) Knowledge and understanding</p> <ol style="list-style-type: none"> <li>1-Identifying the objectives of learning from the principles of physics and linking them to reality</li> <li>2-Learn about the laws of the task in solving important problems in physics.</li> <li>3. Comparison of physical laws in theory and practice</li> <li>4-Identifyingtheimportant equations and the basic laws in physics and their usefulness.</li> <li>5-Introducing how to solve problems and take advantage of the information presented in the problems.</li> <li>6- Arriving at a method of logical thinking in solving problems</li> </ol>
<p>B) Subject specific skills</p> <ol style="list-style-type: none"> <li>1- Organizing learning for the concepts of the basics of general physics</li> <li>2- Shaping a future vision about the usefulness of physics and its laws in other sciences</li> <li>3- Understanding the training on experiments and learning on how to deal with devices and tools for physics experiments.</li> <li>4- Developing the skill of self-evaluation through the feedback provided by the tests</li> </ol>
<p>Teaching and learning methods</p>
<ul style="list-style-type: none"> <li>- Method of delivery, live questioning, problem solving and discussion</li> <li>- Include the use of teaching methods for technology education (data show for in-person education and linking lectures with videos supporting the topic)</li> <li>- The method of distance learning by holding electronic meetings by (Kokol Mit or FCC and others for e-learning)</li> <li>- Encourage students to self-learn</li> </ul>
<p>Evaluation methods</p>
<p>Essay and objective written tests, noting the teaching of the form of activity for the learner by adopting methods (Preliminary Calendar – Structural Calendar – Final Calendar) represented in the quarterly and final tests</p>
<p>C) Thinking skills</p> <ol style="list-style-type: none"> <li>1. Planning</li> <li>2. Organizing</li> <li>3. Observing</li> <li>4. Evaluation</li> </ol>
<p>Teaching and learning methods</p>
<ul style="list-style-type: none"> <li>- Diction – Discussion – Live Interrogation</li> <li>- Self-Organized Learning</li> </ul>
<p>Evaluation methods</p>

In-person and electronic written tests and observation

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

D1-Providing continuous learning opportunities for students and motivating them to do so

D2- Structured self-learning

D3) Social Media

D4- Self-Management

22. Course Structure Chapter One					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	2	referred to in the previous axis and each according to the content	<b>Introduction to Physics and its Evolution</b>	Presentation – Discussion	Editorial tests
2	2	=	<b>Definition of Units</b>	Presentation – Discussion	Editorial tests
3	2	=	<b>Definition of quantities and types</b>	Presentation – Discussion	Editorial tests
4	2	=	<b>Numerical and Directional Quantities</b>	Presentation – Discussion	Editorial tests
5	2	=	<b>Knowledge of trends and trigonometry</b>	Deliverance - Discussion - Live interrogation	Editorial tests
6	2	=	<b>Directional and scalar multiplication</b>	Presentation – Discussion	Editorial tests
7	2	=	<b>Strength</b>	Presentation – Discussion	Editorial tests
8	2	=	<b>Newton's Three Laws</b>	Presentation – Discussion	Editorial tests
9	2	=	<b>Ideal gas and bottles</b>	Deliverance - Discussion - Live interrogation	Editorial tests
10	2	=	<b>Questions about Ideal Gas</b>	Presentation – Discussion	Editorial tests
11	2	=	<b>Velocity and the laws of linear motion</b>	Presentation – Discussion	Editorial tests
12	2	=	<b>Non-linear velocity</b>	Presentation – Discussion	Editorial tests
13	2	=	<b>Determination</b>	Deliverance - Discussion - Live interrogation	Editorial tests
14	2	=	<b>Torque.</b>	Presentation – Discussion	Editorial tests
15	2	=	<b>Matters of Determination</b>	Presentation – Discussion	Editorial tests
16	2	=	<b>EXAM</b>		

### 23. Course Structure Chapter Two

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	2	referred to in the previous axis and each according to the content	<b>Introduction to Heat</b>	Presentation – Discussion	Editorial tests
2	2	=	<b>Thermal Equilibrium</b>	Presentation – Discussion	Editorial tests
3	2	=	<b>Heat transfer methods</b>	Presentation – Discussion	Editorial tests
4	2	=	<b>Thermal Expansion</b>	Presentation – Discussion	Editorial tests
5	2	=	<b>Types of Thermal Expansion</b>	Diction – Discussion – Live Interrogation	Editorial tests
6	2	=	<b>Matters about heat</b>	Presentation – Discussion	Editorial tests
7	2	=	<b>Compressing</b>	Presentation – Discussion	Editorial tests
8	2	=	<b>Atmospheric Pressure</b>	Presentation – Discussion	Editorial tests
9	2	=	<b>Flexibility</b>	Diction – Discussion – Live Interrogation	Editorial tests
10	2	=	<b>Flexibility Transactions</b>	Presentation – Discussion	Editorial tests
11	2	=	<b>viscosity</b>	Presentation – Discussion	Editorial tests
12	2	=	<b>Viscosity method</b>	Presentation – Discussion	Editorial tests
13	2	=	<b>Sound in Liquid and Solid Gas</b>	Diction – Discussion – Live Interrogation	Editorial tests
14	2	=	<b>Sound:</b>	Presentation – Discussion	Editorial tests
15	2	=	<b>Shock Wave</b>	Presentation – Discussion	Editorial tests
16	2	=	<b>EXAM</b>		

### 12. Course Development Plan

- Applying the theory of general physics *in a practical way* in laboratories.

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

## 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
the first	6	This program targets third-year medical physics students, and they are expected to acquire various skills related to the program	Lab 1: Simple pendulum	Theoretical content is presented via lectures and classroom discussions. The course also includes practical activities in laboratories to apply school concepts.	Students are assessed through multiple choice tests and written tests, as well as short research projects.
the second	6		Lab 2: Calculate the focal length of a convex lens		
the third	6		Lab 3: Calculate the focal length of a concave lens		
the fourth	6		Lab 4: Calculating the focal length of mirrors		
Fifth	6		Lab 5: Calculating the viscosity coefficient of liquids		
VI	6		Lab 6: Helical spring		
Seventh	6		Lab 7: Ohm's law		
VIII	6		Lab 8: Kirchhoff's law		
Ninth	6		Lab 9: Calculate the internal resistance of the voltmeter		
The tenth	6		Lab 10: Compound pendulum		
eleventh	6		Lab 11: Calculate the coefficient of friction		
twelveth	6		Lab 12: Calculate the density of the liquid		
Thirteenth	6		Lab 13: Calculate the surface tension coefficient		
fourteenth	6		Lab 14: RC Circuits		
Fifteenth	6		Lab 15: RLC Circuits		
		Final Exam			

<b>11. Course Evaluation</b>					
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>12. Learning and Teaching Resources</b>					
Required textbooks (curricular books, if any)					
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

<b>11.Course Evaluation</b>	
<b>Distribution of the grade from 011 according to the tasks assigned to the student, such as daily preparation and daily, oral, and monthly exams</b>	
<b>Editorial, reports, etc</b>	
<b>12.Learning and Teaching Resources</b>	
Required textbooks (methodology, if any)	Neuroscience: Fifth Edition" Dale Purves
Main references (sources)	- - Physical Chemistry Chemical Physics, by Steven O. et (2000).
Recommended supporting books and references (scientific journals, reports...)	Classical Mechanics: A Basic Introduction, Michael Cohen (2011).
Electronic references, Internet sites	

24. Educational Institution	University of Wasit - College of Science
25. Scientific Department/ Center	Chemistry
26. Course Name / Code	Calculus /Phase I

27. Available attendance forms	In-person with electronic assignments
28. Semester/year	Second Semester of the Academic Year 2023-2024
29. Number of study hours (total)	3 hours weekly
30. Date this description was prepared	
31. Course Objectives	
1-Teaching students the foundations and concepts of differentiation	
2-Studying the rules of calculus	
3-Introduce the middle value theory	
4-Studying ways of integration	
5-Use the rules of differentiation to solve physical problems	

### Course Description

32. Course Outcomes and Teaching, Learning and Evaluation Methods
<p>A- Knowledge Objectives</p> <p>A1-Differential calculations</p> <p>A2-Understanding the foundations of the rules of integration</p> <p>A3- Application of these calculations and their relationship with integration methods</p>
<p>B - Course Skills Objectives</p> <p>B1 -Know the difference between calculus</p> <p>B2- Difference Between Specific and Unspecified Integration</p> <p>B3- Knowledge of types of derivatives</p>
Teaching and learning methods
<p>1- Course</p> <p>2- Explanatory Videos</p> <p>3- Panel Discussions</p>

Evaluation methods
1- Monthly tests. 2- Quizzes
C- Emotional and value objectives: C1-Respect Discipline. Competition:
Teaching and learning methods
1- Course 2- Explanatory Videos 3- Panel Discussions
Evaluation methods
1- Monthly tests. 2- Quizzes
(d) Transferred general and qualifying skills (other skills related to employability and personal development). D1- Enhancing the student's self-confidence D2-Training in Thinking and Scientific Reasoning



33. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	2	General Revision	differentiation	Lecture and Video	Testing and Discussion
2	2	Learn the scientific facts	Derivation	=	=
3	2	=	Derivative	=	=
4	2	=	Definition of Derivation	=	=
5	2	=	Finding the Derivative Using the Definition	=	=
6	2	=	Derivative rules	=	=
7	2	=	Finding the Derivative Using Derivative Rules	=	=
8	2	=	exam	=	=
9	2	=	Derivatives of circular functions	=	=
10	2	=	Implicit Derivation	=	=
11	2	=	Examples of different functions	=	=
12	2	=	Apps on Derivative	=	=
13	2	=	Engineering Applications	=	=
14	2	=	Physical applications	=	=
15	2	=	exam	=	=

34. Infrastructure

3- Required textbooks	The book of calculus is available in the college library
4- Key References (Sources)	AL-Taai, A.A.,
C) Recommended books and references (scientific journals, reports .....	International Publishing House Baghdad University
D) Electronic references, websites ,.....	Web science

### 35. Course Development Plan

Allocate applied hours to solve the largest number of various examples

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

36. Educational Institution	Faculty of Science – University of Wasit
37. University Department/ Center	Chemistry
38. Course Name / Code	Human Rights – First Grade
39. Programs he enters into	
40. Available attendance forms	
41. Semester/year	2023-24 school year.
42. Number of study hours (total)	(2) Theoretical
43. Date this description was prepared	
44. Course Objectives	
- Introducing human rights	
- Identify the most important sources of human rights and freedoms	
- Identify the most important international and national guarantees of human rights	
- Learning about the Universal Declaration of Human Rights	
- Learn about human rights and freedoms in Islam and the Iraqi Constitution	
- Shaping learners' knowledge of the historical development of the concept of human rights and freedoms	
- Identify the most important characteristics and advantages of the definition of human rights	
- Explanation of the role of regional organizations. in the protection of human rights	
- Learn about the concept of democracy and its most important forms	
- Recognition of the right to vote and to be elected	
- Recognize the stages of elections	

45. Learning Outcomes and Teaching, Learning and Evaluation Methods

Knowledge and understanding

- A1-Identifythe objectives of human rights
- A2-Identifying the subject of the development of the concept of human rights and democracy
- A3- Comparison between human rights in the past and the present
- A4- Identifying the methods of scientific research

Subject specific skills

- B1 – The lecture is well organized
- B2- Forming a future vision towards the forms of classroom management
- B3 – Understanding the individual differences of students
- B4- Developing the skill of self-evaluation through what the tests provide to students

Teaching and learning methods

- Method of delivery, live questioning, problem solving and discussion
- Include the use of technology in teaching methods
- Encourage students to self-learn

Evaluation methods

Essay and objective written tests, noting the teaching of the form of activity for the learner by adopting methods  
(Preliminary Calendar – Structural Calendar – Final Calendar) represented in the quarterly and final tests

-Thinking Skills

- C1-Planning
- Organization
- MONITORING
- C4- Calendar

Teaching and learning methods

- Diction – Discussion – Live Interrogation
- Self-Organized Learning

Evaluation methods

Written Quizzes and Observation

(d) General and transferred skills (other skills related to employability and personal development).

D1-Providing continuous learning opportunities for students and motivating them to do so

D2- Structured self-learning

Social Media

D4- Self-Management

46. Course Structure

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	2	Referred to in the previous axis and each according to the content	Definition of human rights	Presentation – Discussion	Editorial tests
2	2	=	Characteristics of human rights	Presentation – Discussion	Editorial tests
3	2	=	The concept of human rights	Presentation – Discussion	Editorial tests
4	2	=	The concept of human rights	Presentation – Discussion	Editorial tests
5	2	=	Human Rights	Presentation – Discussion	Editorial tests
6	2	=	Internal safeguards 7. The principle of the rule of law	Diction – Discussion – Live Interrogation	Editorial tests
7	2	=	Human Rights and Nomination	Presentation – Discussion	Editorial tests
8	2	=	Rights and Freedoms in the Constitution	Presentation – Discussion	Editorial tests
9	2	=	Rights and Freedoms in the Constitution	Presentation – Discussion	Editorial tests
10	2	=	Rights and Freedoms in Islam	Presentation – Discussion	Editorial tests
11	2	=	Judicial Safeguards	Presentation – Discussion	Editorial tests
12	2	=	The concept of democracy	Diction – Discussion – Live Interrogation	Editorial tests
13	2	=	Types of democracy	Presentation – Discussion	Editorial tests

14	2	=	New Democracy	Presentation – Discussion	Editorial tests
15	2	=	Democratic Mechanisms	Presentation – Discussion	Editorial tests
16	2	=	Pillars of Democracy	Presentation – Discussion	Editorial tests
17	2	=	Women and Elections	Presentation – Discussion	Editorial tests
18	2	=	Forms of Democracy	Diction – Discussion – Live Interrogation	Editorial tests
19	2	=	Electoral College	Presentation – Discussion	Editorial tests
20	2	=	Election Phases	Presentation – Discussion	Editorial tests
21	2	=	Election Types	Presentation – Discussion	Editorial tests
22	2	=	Explanation of the role of regional organizations.	Presentation – Discussion	Editorial tests
23	2	=		Presentation – Discussion	Editorial tests
24	2	=		Diction – Discussion – Live Interrogation	Editorial tests
25	2	=		Presentation – Discussion	Editorial tests
26	2	=		Presentation – Discussion	Editorial tests
27	2	=		Presentation – Discussion	Editorial tests
28	2	=		Presentation – Discussion	Editorial tests
29	2	=		Presentation – Discussion	Editorial tests
30	2	=		Diction – Discussion – Live Interrogation	Editorial tests
31	2	=		Diction – Discussion –	Editorial tests

				Live Interrogation	
32	2	=	EXAM		

47. Infrastructure 2 Classrooms Department's Library

Required Readings:

- Basic Texts
- Course Books
- Other

Course Books

### Description of the Academic Program- Phase II

#### Course Description

<b>1. Educational Institution</b>	University of Wasit - College of Science
<b>2. Scientific Department/ Center</b>	Chemistry
<b>3. Course Name / Code</b>	Analytical Chemistry - Phase II
<b>4. Available attendance forms</b>	In-Person
<b>5. Semester/year</b>	First and second semesters of 2023-2024
<b>6. Number of study hours (total)</b>	5 Hours (2 theoretical hours + 3 practical hours)
<b>7. Date this description was prepared</b>	
<b>8. Academic Program Objectives</b>	
Study of weight quantitative analysis, sediment solubility, and extraction methods	





## 9. Learning Outcomes and Teaching, Learning and Evaluation Methods

### a. Knowledge objectives

A1-The student's knowledge of chemical analysis methods

A2- Know the meaning of quantitative weight analysis and methods of conducting operations

A3- Understand the meaning of the solubility product constant

### b. Skill objectives of the course

B1 –The student must be proficient in solving problems related to weight analysis ed

B2- Distinguish between extraction techniques and their applications

B3 -Distinguish between the causes leading to sediment pollution and methods of treating it

### Teaching and learning methods

1- Lectures

2- Monthly exams

3- Annual exams

C- Emotional and value goals

- C1- Adopting a dialogue style between the student and the teacher
- A2- Preparing organized reports
- A3- Adopting the discussion method

Evaluation methods

- Lectures
- Monthly exams
- Annual exams

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

- D1- The student's ability to work within the educational and professional work team
- D2- Positive thinking and utilizing the knowledge he has received
- D3- The ability to deal with parties outside the university and train with them
- D4- That the student is able to learn and master the teaching profession

Teaching and learning methods

- Diction – Discussion – Live Interrogation
- Self-Organized Learning

Evaluation methods

Written Quizzes and Observation

- (d) General and transferred skills (other skills related to employability and personal development).
  - D1-Providing continuous learning opportunities for students and motivating them to do so
  - D2- Structured self-learning
  - Social Media
  - D4- Self-Management

## First Semester

Weeks	Hours	Required teaching outcomes	Unit name/Subject	Teaching method	Evaluation method
1	2 Theoretical +3 practical	Quantitative weight analysis	Chapter 1 (Quantitative weight analysis)	Lecture + Lab	Weekly and monthly exams and lab reports
2	2 Theoretical +3 practical	Quantitative weight analysis	Continuation of the first chapter	Lecture + Lab	Weekly and monthly exams and lab reports
3	2 Theoretical +3 practical	Quantitative weight analysis	Chapter 2 (Calculations in quantitative weight analysis)	Lecture + Lab	Weekly and monthly exams and lab reports
4	2 Theoretical +3 practical	Quantitative weight analysis	Continuation of the chapter with solving the questions	Lecture + Lab	Weekly and monthly exams and lab reports
5	2 Theoretical +3 practical	Sediment solubility	Chapter 3 (Sediment solubility)	Lecture + Lab	Weekly and monthly exams and lab reports
6	2 Theoretical +3 practical	Sediment solubility	Continuation of the chapter with solving the questions	Lecture + Lab	Weekly and monthly exams and lab reports
7	2 Theoretical +3 practical	Exam	Exam	Lecture + Lab	Weekly and monthly exams and lab reports
8	2 Theoretical +3 practical	Sediment solubility	Chapter 4 (factors effecting Sediment solubility)	Lecture + Lab	Weekly and monthly exams and lab reports
9	2 Theoretical +3 practical	Sediment solubility	Effect of ionic strength and effectiveness factor	Lecture + Lab	Weekly and monthly exams and lab reports
10	2 Theoretical +3 practical	Sediment solubility	Continuation of the chapter with solving the questions	Lecture + Lab	Weekly and monthly exams and lab reports
11	2 Theoretical +3 practical	Sediment formation	Chapter 5 (Crystalline formation of the sediment)	Lecture + Lab	Weekly and monthly exams and lab reports
12	2 Theoretical +3 practical	Sediment formation	Colloidal state	Lecture + Lab	Weekly and monthly exams and lab reports
13	2 Theoretical +3 practical	Sediment pollution	Sediment contamination and treatment	Lecture + Lab	Weekly and monthly exams and lab reports
14	2 Theoretical +3 practical	Exam	Exam	Lecture + Lab	Weekly and monthly exams and lab reports
15		Mid-year holiday	Mid-year holiday		
16		Mid-year holiday	Mid-year holiday		

## Second Semester

Weeks	Hours	Required teaching outcomes	Unit name/Subject	Teaching method	Evaluation method
17	2 Theoretical +3 practical	Separation methods	Chapter 6 (Separation methods)	Lecture + Lab	Weekly and monthly exams and lab reports
18	2 Theoretical +3 practical	Separation methods	Chapter 9 (Indirect separation techniques)	Lecture + Lab	Weekly and monthly exams and lab reports
19	2 Theoretical +3 practical	Extraction	The forces acting between the particles in the two phases and the extraction systems	Lecture + Lab	Weekly and monthly exams and lab reports
20	2 Theoretical +3 practical	Extraction	extraction systems with solving the questions	Lecture + Lab	Weekly and monthly exams and lab reports
21	2 Theoretical +3 practical	Chromatography	Chapter 10 (Chromatography)	Lecture + Lab	Weekly and monthly exams and lab reports
22	2 Theoretical +3 practical	Chromatography	Continuation of Chromatography	Lecture + Lab	Weekly and monthly exams and lab reports
23	2 Theoretical +3 practical	Exam	Exam	Lecture + Lab	Weekly and monthly exams and lab reports
24	2 Theoretical +3 practical	Ion exchange	Chapter 11 (Ion exchange)	Lecture + Lab	Weekly and monthly exams and lab reports
25	2 Theoretical +3 practical	Ion exchange	2 Theoretical +3 practical	Lecture + Lab	Weekly and monthly exams and lab reports

11. Infrastructure	
1- Required prescribed books	<ul style="list-style-type: none"> <li>- Analytic chemistry (First Part)/ general foundations of Quantitative weight analysis by, Dr. Safaa Rezouqi Al-Mureb</li> <li>- Analytic chemistry (Second Part)/ Introduction to separation methods, by, Dr. Safaa Rezouqi Al-Mureb</li> </ul>
2- Main references (Sources)	
a. Recommended Books and references (Scientific Journals, reports, ...)	- Analytical chemistry the fundamentals Chemical separation methods by John A. Dean
b. Electronic references, websites	<ul style="list-style-type: none"> <li>- Daniel C. Harris, "Quantitative Chemical Analysis" Eighth Ed. Freedom and company New York, 2010.</li> <li>- Hage D.; Carr J. "Analytical Chemistry and quantitative analysis" International Ed. Person, USA, 2011.</li> </ul>

## 1. Course Structure

Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 <sup>st</sup>	3	Introduction Gravimetric analysis	Analytical chemistry	Paper lectures	Daily exam and discussion
2 <sup>nd</sup>	3	Determination of water of crystallization in hydrated copper sulphate	Analytical chemistry	Paper lectures	Daily exam and discussion
3 <sup>rd</sup>	3	Determination of sulfate as barium sulfate BaSO <sub>4</sub> .	Analytical chemistry	Paper lectures	Daily exam and discussion
4 <sup>th</sup>	3	Determination of Ca <sup>2+</sup> as calcium oxalate.	Analytical chemistry	Paper lectures	Daily exam and discussion
5 <sup>th</sup>	3	Determination of Iron as Ferric oxide Fe <sub>2</sub> O <sub>3</sub> .	Analytical chemistry	Paper lectures	Daily exam and discussion
6 <sup>th</sup>	3	Determination of lead as lead chromate.	Analytical chemistry	Paper lectures	Daily exam and discussion
7 <sup>th</sup>	3	Determination of Nickel as dimethylglyoxime complex.	Analytical chemistry	Paper lectures	Daily exam and discussion
8 <sup>th</sup>	3	Gravimetric determination of sulphate in tap water	Analytical chemistry	Paper lectures	Daily exam and discussion
9 <sup>th</sup>	3	Determination of chloride as silver chloride AgCl	Analytical chemistry	Paper lectures	Daily exam and discussion
10 <sup>th</sup>	3	Determination of aluminum as 8 hydroxy quinolate	Analytical chemistry	Paper lectures	Daily exam and discussion
11 <sup>th</sup>	3	Determination of copper as copper (1) thiocyanate	Analytical chemistry	Paper lectures	Daily exam and discussion
12 <sup>th</sup>				Paper lectures	

<b>13 th</b>	<b>3</b>	Introduction Solvent extraction	Analytical chemistry		Daily exam and discussion
	<b>3</b>	Determination of the percentage of Iodine extraction by an organic solvent	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>14 th</b>	<b>3</b>	Separate of Chromatography	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>15 th</b>	<b>3</b>	exam	Analytical chemistry	Paper lectures	Month exam

## 2. 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

## 3. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Skoog D. ,Fundamentals of Analytical Chemistry,Nitnth ed., 2016
Main references (sources)	Robert L. Pecsok , Modern Methods of Chemical Analysis , John Wiley & sons, -2 New York
Recommended books and references (scientific journals, reports...)	Douglas A. Skoog , Fundamentals of analytical chemistry 4 -1 th edition , Holt Rinehart & Winston, 1983
Electronic References, Websites	Royal Chemical Society

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

10. Educational Institution	University of Wasit - College of Science
11. Scientific Department/ Center	Department of Chemistry Sciences
12. Course Name / Code	Inorganic Chemistry, Phase II
13. Available attendance forms	In presence
14. Semester/year	First and second semesters of 2023-2024
15. Number of study hours (total)	Two hours for the theoretical part and three hours for the practical part
16. Date this description was prepared	
17. Course Objectives	
<ol style="list-style-type: none"><li>9. Introduction to the branches of chemistry in general and inorganic chemistry for the second stage in particular</li><li>10. Know the oxidation states of all elements of the periodic table.</li><li>11. Oxidation and reduction chemistry.</li><li>12. Sour-base chemistry.</li><li>13. Chemistry of solid elements.</li><li>14. Molecular symmetry.</li><li>15. Chemistry of the fifteen group</li><li>16. Chemistry of the sixteenth group</li><li>17. Chemistry of the seventeenth group</li><li>18. Chemistry of the eighteenth group</li></ol>	

## 56. Course Outcomes and Teaching, Learning and Evaluation Methods

### A- Knowledge Objectives

5. Inorganic chemistry
6. The chemistry of the main elements completely
7. Acid and base chemistry.
8. solid phase
9. Chemistry of Aggregates 15-18.

### B - Course Skills Objectives

6. To know the origin of the theories of acid and base.
7. Oxidation and reduction chemistry and electrochemical cells.
8. Hybridization and expected geometry of molecules and solid-state study of ionic and covalent compounds
9. Interactions of group 15 elements and preparation of their compounds.
10. Interactions of group 16 elements and preparation of their compounds.
11. Interactions of the elements of group 17 and 18 and preparation of their compounds.

### Teaching and learning methods

4. Using paper lectures.
5. The available means of presentation, for example, the presentation and also the blackboard.
6. Using video for lectures and also for experiments within the curriculum.

### Evaluation methods

8. Participate in lectures orally (oral examinations).
9. Weekly assignments.
10. Monthly tests.
11. Additional scientific activities.
12. Periodic scientific reports.
13. Adopting the method of scientific discussion.
14. Annual Tests.

### C- Emotional and value objectives:

3. Adopting the lecture method, scientific questions and answers, and the interaction between the student and the professor
4. Preparing scientific reports on the scientific method

### Teaching and learning methods

1. Use paper lectures.



2. Available means of illustration, such as the presentation and the blackboard
3. Using video for lectures and also for experiments within the curriculum

### Evaluation methods

1. Participate in lectures orally (oral examinations).
2. Weekly Assignments.
3. Monthly tests.
4. Additional scientific activities
5. Periodic scientific reports.
6. Adopting the method of scientific discussion.
7. Annual Tests.

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

- 4) Expanding the student's scientific perceptions and making him engage in university life.
- 5) Extracting information from more than one scientific source and not relying on one single source.
- 6) Working in a team spirit and positive scientific cooperation among students.

How to prepare monthly and final reports for the scientific material

### 57. Course Structure

Week	Hours	Intended Learning Outcomes	Module / Course Name or	Teaching method	Valuation Method
1	2 theoretical + 3 practical	Introduction to inorganic chemistry + preparation and diagnosis of simple salt	Introduction about inorganic chemistry for year two	Google meet and google class	Homework and test
2	2 theoretical + 3 practical	Oxidation states of the represented elements + preparation and diagnosis of simple salt	Oxidation states for representative elements	Google meet and google class	Homework and test
3	2 theoretical + 3 practical	Oxidation states of the represented elements + preparation and diagnosis of simple salt	Oxidation states for transition elements	Google meet and google class	Homework and test
4	2 theoretical + 3 practical	Oxidation and reduction reactions of electrochemical cells + preparation and diagnosis of double salt	Oxidation and reduction in electrochemical cells	Google meet and google class	Homework and test
5	2 theoretical + 3 practical	Oxidation and reduction reactions of electrochemical cells + calculation of the number of crystallization water molecules	Oxidation and reduction in electrochemical cells	Google meet and google class	Homework and test
6	2 theoretical + 3 practical	Acid-Base Chemistry + Laboratory Acid-Base Preparation	Acid base chemistry	Google meet and google class	Homework and test
7	2 theoretical + 3 practical	Acid-Base Chemistry + Laboratory Acid-Base Preparation	Acid base chemistry	Google meet and google class	Homework and test
8	2 theoretical + 3 practical	Solid State Chemistry + Complex Salt Preparation	Solid state chemistry	Google meet and google class	Homework and test

9	2 theoretical + 3 practical	Solid State Chemistry + Complex Salt Preparation	Solid state chemistry	Google meet and google class	Homework and test
10	2 theoretical + 3 practical	Molecular Symmetry + Complex Salt Diagnosis	Symmetry	Google meet and google class	Homework and test
11	2 theoretical + 3 practical	Molecular Symmetry + Complex Salt Diagnosis	Symmetry	Google meet and google class	Homework and test
12	2 theoretical + 3 practical	Group Chemistry 15 + Complex Salt Preparation	Group 15 chemistry	Google meet and google class	Homework and test
13	2 theoretical + 3 practical	Group Chemistry 16 + Complex Salt Diagnosis	Group 16 chemistry	Google meet and google class	Homework and test
14	2 theoretical + 3 practical	Group Chemistry 16 + Complex Salt Diagnosis	Group 17 chemistry	Google meet and google class	Homework and test
15	2 theoretical + 3 practical	Group Chemistry 18 + Calculating the number of molecules of crystalline water for a complex salt	Group 18 chemistry	Google meet and google class	Homework and test

#### 58. Infrastructure

E- Required textbooks	Inorganic chemistry, Missler and Tarr
F- Key References (Sources)	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
7) Recommended books and references (scientific journals, reports ,.....)	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
8) Electronic references, websites ,.....	Royal Chemical Society

#### 59. Course Development Plan

Relying on the latest and updated lectures and scientific content

<b>. 1 Course Structure</b>					
<b>Evaluation method</b>	<b>Learning method</b>	<b>Unit or subject name</b>	<b>Required Learning Outcomes</b>	<b>Hours</b>	<b>Weeks</b>
<b>Daily exam and discussion</b>	Detecting the iron ion and calculating the number of water molecules, a general introduction, the origin of the theory of acidity and acidity, and then some simple and advanced examples	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>1</b>
<b>Daily exam and discussion</b>	Experiment with acid, base and salt	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>2</b>
<b>Daily exam and discussion</b>	Preparation of sodium hydroxide	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>3</b>
<b>Daily exam and discussion</b>	Preparation of aluminum sulfate alum with potassium sulfate	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>4</b>
<b>Daily exam and discussion</b>	Detection of aluminum alum ion	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>5</b>
<b>Daily exam and discussion</b>	Calculate the number of molecules of water in alum	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>6</b>
<b>Daily exam and discussion</b>	Preparation of potassium sulphate alum with copper(II) sulphate.	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>7</b>
<b>Daily exam and discussion</b>	Detection of aluminum alum ion and Calculate the number of molecules of water in alum	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>8</b>
<b>Daily exam and discussion</b>	Preparation of nickel complex with dimethylglyoxime	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>9</b>
<b>Daily exam and discussion</b>	<b>Exam</b>	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>10</b>
<b>Daily exam and discussion</b>	A make-up week	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>11</b>
<b>Daily exam and discussion</b>	Preparation of ammonium sulphate iron (II) sulphate. n hydrate salt. Detection of the resulted ions.	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>12</b>
<b>Daily exam and discussion</b>	Preparation of $\text{Na}_3[\text{Fe}(\text{OX})_3]$ complex	<b>Inorganic chemistry</b>	Paper lectures		<b>13</b>
<b>Daily exam and discussion</b>	Detect iron ions and calculate the number of water molecules	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>14</b>

<b>Daily exam and discussion</b>	Preparation of $\text{Na}_2[\text{Co}(\text{EDTA})]$ complex The characterization of the complex	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>15</b>
<b>Daily exam and discussion</b>	Detect cobalt ions and calculate the number of water molecules	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>16</b>
<b>Daily exam and discussion</b>	Preparation of some multidentate organic ligands DMG, and the complexation reactions with transition metal ions.	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>17</b>
<b>Daily exam and discussion</b>	Detect iron ions and calculate the number of water molecules	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>18</b>
<b>Daily exam and discussion</b>	Exam	<b>Inorganic chemistry</b>	Paper lectures	<b>3</b>	<b>19</b>

### Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

60. Educational Institution	University of Wasit - College of Science
61. Scientific Department/ Center	Department of Chemistry Sciences
62. Course Name / Code	Organic Chemistry/ Phase II
63. Available attendance forms	Presence
64. Semester/year	First and Second Semesters - 2023/2024
65. Number of study hours (total)	3 hours theoretical + 3 hours practical
66. Date this description was prepared	
67. Course Objectives	

1. Highlight the importance of organic chemistry and its applications
2. Identify the most important features of organic chemistry
3. The student learned all about the interactions and mechanisms of different reactions, and the naming of organic compounds
4. Students should get acquainted with stereochemistry and the most important concepts it deals with
5. Students should have a strong base in organic chemistry that enables them to study advanced in this field
6. Learn about the most important organic applications

68. Course Outcomes and Teaching, Learning and Evaluation Methods
<p>A- Knowledge Objectives</p> <p>A1- Identifying the concept of acidity and the formation of salts for phenols and carboxylic acids</p> <p>A2- Using alcohol oxidation methods to prepare aldehydes and ketones</p> <p>A3-Knowledge of chiral centers, counterparts and optical opposites, naming R,S in stereochemistry</p> <p>A4-The use of the Kreinhard reagent and the Hale-Volhard-Sielensky reactions in the preparation of carboxylic acids</p> <p>A5- Hoffmann segmentation reaction mechanism</p> <p>A6. Reactions of diazonium salts</p>
<p>B - Course Skills Objectives</p> <p>B1- To know how the different reactions work by knowing the mechanics of the reaction</p> <p>B2 - Students learn different ways to prepare organic compounds</p> <p>B3- Identifying the importance of organic compounds and their impact on the environment and human life</p> <p>B4-Linking the theoretical aspect with the practical aspect in the study of organic chemistry</p>
Teaching and learning methods
<p>1: Lecture Method and Using the Interactive Whiteboard</p> <p>2: Explanation, clarification and discussion</p> <p>3: Providing students with the basics and additional topics related to the outputs of thinking</p> <p>4: Forming panel discussions to discuss topics that require reflection, analysis and conclusion</p> <p>5: Brainstorming by asking reflective questions during the lecture</p> <p>6: Giving the student assignments that require explanations and causal methods</p> <p>7: Understanding and continuous communication with the ideas presented during the lecture.</p>
Evaluation methods

<p>1: Practical tests  2: Theoretical tests  3: Standardized tests (monthly) – assignments – surprise exams  4: Numbers of studies</p>
<p>C- Emotional and value objectives:  C1- Knowledge Enhancement  C2-Promotingteamwork</p>
<p>Teaching and learning methods</p>
<p>Lecture -Group Discussion -Questions and Answers</p>
<p>Evaluation methods</p>
<p>Practical tests - theoretical tests -discussion</p>
<p>(d) Transferred general and qualifying skills (other skills related to employability and personal development).  D1- Knowledge Skills Remembering and Analyzing  D2-Training skills on extracting information from solid sources  D3- Skills for conducting chemical reactions and acquiring technical skills  D4- Self-learning and time management skills</p>

18. Course Structure					
First Semester					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	3	Understand and learn scientific skills in thinking and creativity	A holistic view of vehicles, Hybridization, Octal, Basal and Acidic	Lecture and Discussion	Tests of all kinds and asking questions
Second	3	Understanding scientific concepts	Type of active groups, intermediate state, folds of organic reactions, isomers	Lecture and Discussion	Tests of all kinds and asking questions
Third	3	Understanding scientific concepts	Vacuum, Proton Solvents Magnetic Moment	Lecture and Discussion	Tests of all kinds and asking questions
Fourth	3	Understand scientific concepts and learn methods of conducting chemical reactions	Alkanes, Systematic and Common Nomenclature, Methods of Preparation	Lecture and Discussion	Tests of all kinds and asking questions
Fifth	3	Understanding scientific concepts	Ring Alkanes, Naming, Asanas for Alkanes, Newman Asanas	Lecture and Discussion	Tests of all kinds and asking questions
Sixth	3	Learn how to conduct chemical reactions and their mechanics	Ring alkanes positions Preparation of only ring alkanes, free radical reactions	Lecture and Discussion	Tests of all kinds and asking questions
Seventh	3	Learn how to conduct chemical reactions and understand scientific concepts	Completion of preparation methods and addressing petrochemicals	Lecture and Discussion	Tests of all kinds and asking questions
Eighth	3	----	Second Assessment Exam	----	Tests of all kinds
Ninth	3	Understanding scientific concepts	Alkynes, the Z, E naming system and the common naming system and the preparation of alkanes.	Lecture and Discussion	Tests of all kinds and asking questions



Tenth	3	Learn how to conduct chemical reactions and their mechanics	Geometric modes, resonance diatoms, and alkene reactions	Lecture and Discussion	Tests of all kinds and asking questions
Eleventh	3	Learn how to conduct chemical reactions and their mechanics	Reactions of alkanes as opposed to Markovnikov and the reactions of ring formation	Lecture and Discussion	Tests of all kinds and asking questions
Twelfth	3	Learn how to conduct chemical reactions and their mechanics	Cyclic alkanes Name them and their interactions and reveal the alkanes and the mechanics of the reaction	Lecture and Discussion	Tests of all kinds and asking questions
Thirteen	3	Learning methods of conducting chemical reactions and understanding scientific concepts	Alkanes, their designation and methods of preparation	Lecture and Discussion	Tests of all kinds and asking questions
fourteenth	3	Learning methods of conducting chemical reactions and understanding scientific concepts	Alkanes, their interactions and detection	Lecture and Discussion	Tests of all kinds and asking questions
Week	3	-----	Second Assessment Exam	-----	Tests of all kinds
<b>Chapter Two</b>					
<b>First</b>	3	Understanding scientific concepts	Aromatics Benzene Nomenclature	Lecture and Discussion	Tests of all kinds and asking questions
<b>Second</b>	3	Learn how to conduct chemical reactions and their mechanics	Benzene reactions (sulfonation, alkaline nitration, halogenation)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Third</b>	3	Learn how to conduct chemical reactions and their mechanics	Reactions of dysonbium salts Compact aromatic compounds	Lecture and Discussion	Tests of all kinds and asking questions
<b>Fourth</b>	3	Learn how to conduct chemical reactions and their mechanics	Mechanics of aromatic reactions	Lecture and Discussion	Tests of all kinds and asking questions
<b>Fifth</b>	3	Learn how to conduct chemical reactions and their mechanics	Alcohols, Label, Preparation	Lecture and Discussion	Tests of all kinds and asking questions

<b>Sixth</b>	3	Learn how to conduct chemical reactions and their mechanics	Alcohol reactions and reaction mechanics	Lecture and Discussion	Tests of all kinds and asking questions
<b>Seventh</b>	3	----	Second Assessment Exam	----	Tests of all kinds
<b>Eighth</b>	3	Learn how to conduct chemical reactions and their mechanics	Ethers, Naming, Methods of Preparation	Lecture and Discussion	Tests of all kinds and asking questions
<b>Ninth</b>	3	Learn how to conduct chemical reactions and their mechanics	Their reactions are ethers	Lecture and Discussion	Tests of all kinds and asking questions
<b>Tenth</b>	3	Understand scientific concepts and learn their mechanics	Mechanics SN1,SN2	Lecture and Discussion	Tests of all kinds and asking questions
<b>Eleventh</b>	3	Understanding scientific concepts	Alkyl halides, naming them	Lecture and Discussion	Tests of all kinds and asking questions
<b>Twelveth</b>	3	Learn how to conduct chemical reactions and their mechanics	Alkyl halide reactions, methods of preparation	Lecture and Discussion	Tests of all kinds and asking questions
<b>Thirteen</b>	3	Learn how to conduct chemical reactions and their mechanics	Supplementation of halide reactions and E1 deletion reactions. E2	Lecture and Discussion	Tests of all kinds and asking questions
<b>fourteenth</b>	3	----	Second Assessment Exam	----	Tests of all kinds
<b>Fifteenth</b>	3	----	A general review of the material to separate and stand on the important things	----	Discussions with students

#### 70. Infrastructure

7- Required textbooks

8- Key References (Sources)	1-Morrison and boyd(Org. Sixth Edition. Volume 2. 2-Mc Murry(Org. Chem.) <sup>7</sup> th Ed. 3-Organic Chemistry/Eighth Edition L.G. Wade, JR./2013/ Whitman college
9- Recommended books and references (scientific journals, reports ,.....)	
10- Electronic references, websites ,.....	Use of some international websites Use of some special software

### 71. Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

<b>. 1 Course Structure Lab</b>					
<b>Evaluation method</b>	<b>Learning method</b>	<b>Unit or subject name</b>	<b>Required Learning Outcomes</b>	<b>Hours</b>	<b>Weeks</b>
<b>Daily exam and discussion</b>	Safety lab	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>1</b>
<b>Daily exam and discussion</b>	Melting point	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>2</b>
<b>Daily exam and discussion</b>	boiling point	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>3</b>
<b>Daily exam and discussion</b>	density	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>4</b>
<b>Daily exam and discussion</b>	Sublimation	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>5</b>
<b>Daily exam and discussion</b>	distillation	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>6</b>
<b>Daily exam and discussion</b>	Fractional distillation	<b>Organic chemistry</b>	Paper lectures		
<b>Daily exam and discussion</b>	Separation by funnel	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>7</b>
<b>Daily exam and discussion</b>	Thin layer chromatography	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>8</b>
<b>Daily exam and discussion</b>	Exam	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>9</b>
<b>Daily exam and discussion</b>	Burning	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>10</b>
<b>Daily exam and discussion</b>	Detection of alkene	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>11</b>
<b>Daily exam and discussion</b>	Detection of alcohol and its type	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>12</b>
<b>Daily exam and discussion</b>	Detection of aldehyde and ketone	<b>Organic chemistry</b>	Paper lectures		
<b>Daily exam and discussion</b>	Preparation of methane	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>13</b>
<b>Daily exam and discussion</b>	aromatic compound	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>14</b>
<b>Daily exam and discussion</b>	Detection of aromatic compounds	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>15</b>
<b>Daily exam and discussion</b>	Preparation of nitrobenzene	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>16</b>
<b>Daily exam and discussion</b>	Nitrobenzene purification	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>17</b>
<b>Daily exam and discussion</b>	Separating caffeine from tea	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>18</b>
<b>Daily exam and discussion</b>	Complete caffeine extraction and diagnosis	<b>Organic chemistry</b>	Paper lectures		

<b>Daily exam and discussion</b>	Preparation of aspirin	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>19</b>
<b>Daily exam and discussion</b>		<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>20</b>
<b>Daily exam and discussion</b>	Aspirin isolation and diagnosis	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>21</b>
<b>Daily exam and discussion</b>	Separate the unicorn from the cloves	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>22</b>
<b>Daily exam and discussion</b>	Separate the unicorn from the cloves	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>23</b>
	Preparation of cyclohexanol	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>24</b>
	Bayer detector	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>25</b>
		<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>26</b>
	Preparation of esters from alcohols	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>27</b>
	compensation week	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>28</b>
	Exam	<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>29</b>
		<b>Organic chemistry</b>	Paper lectures	<b>3</b>	<b>30</b>

### Course Description

72. Educational Institution	University of Wasit - College of Science
73. Scientific Department/ Center	Chemistry
74. Course Name / Code	Physical Chemistry – Phase II Prof. Rahim Aziz. Ph.D
75. Available attendance forms	In-Person
76. Semester/year	2023-2024
77. Number of study hours (total)	0.50 mL/hr
78. Date this description was prepared	79.
79. Course Objectives	
1- Introducing the student to what physical chemistry is.	
2- Teach students how to link this branch of chemistry with other branches of chemistry and how to benefit from it.	
3- The student should learn the skills for solving problems and ideas in this specialization.	

## 80. Course Outcomes and Teaching, Learning and Evaluation Methods

### A- Knowledge Objectives

- A1-Knowledge of the basics of kinetic chemistry
- A2-Knowledge of the basics of electrochemistry
- A3-Expanding the understanding of the topics to include the kinetic theory of molecules.
- A4-A brief study on photochemistry

### B - Course Skills Objectives

- B1- Logical thinking and solving mathematical problems.
- B2- Identify the laws of physical chemistry and their basis.
- B3- Apply the knowledge they have studied in the form of problems they solve.

### Teaching and learning methods

- 1- Classic ways of meeting and asking questions.
- 2- Submit assignments.
- 3- Effective Communication

### Evaluation methods

- 1- Monthly exams
- 2- Assignment work
- 3- Daily pop quizzes

### C- Emotional and value objectives:

- C1-Training students in deduction methods and scientific knowledge
- C2-Training students in the simulation method

### D) Transferred general and qualifying skills (other skills related to employability and personal development).

- D1- Using modern methods of teaching
- D2- Relying on modern sources to fold capabilities

81. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
<b>First Semester</b>					
<b>First Week</b>	3	Learn the principles of the laws of gases	Gases in general	Lecture	Answering questions in the lecture + surprise daily exams
<b>Second Week</b>	=	Knowing the foundations of Thermodynamics	The Zero Law of Thermodynamics	=	=
<b>Third Week</b>	=	Acquisition of scientific facts for thermo applications	The First Law of Thermodynamics, Applications	=	=
<b>Fourth Week</b>	=	Knowledge of scientific facts	Isothermal and literary processes	=	=
<b>Fifth Week</b>	=	=	Joule-Thomson phenomenon and its applications	=	=
<b>Sixth Week</b>	=	=	Thermochemistry - Hess' law	=	=
<b>Seventh Week</b>	=	=	Temperature of reaction, temperature change of reaction with temperature	=	=
<b>Eighth Week</b>	=	=	The Second Law of Thermodynamics - Basic Concepts	=	=
<b>Ninth Week</b>	=	=	Phase Transition Entropy Changes- Troton's Law	=	=
<b>Tenth Week</b>	=	=	Entropy for ideal gas expansion and compression	=	=
<b>Eleventh Week</b>	=	=	Entropy changes with temperature, gases, and liquids	=	=
<b>Twelfth Week</b>	=	=	Gypsum energy and Helmholtz free energy	=	=
<b>Thirteenth Week</b>	=	=	Thermodynamic Properties	=	=
<b>Fourteenth Week</b>	=	=	Maxwell's Relationships	=	=

<b>Fifteenth Week</b>	=	Knowing the level of students	examine	=	Paper-based exam
<b>Second Semester</b>					
<b>First Week</b>	3	Knowledge of scientific facts	The Third Law of Thermodynamics	Lecture	Answering questions in the lecture + surprise daily exams
<b>Second Week</b>	=	=	Phase rule	=	=
<b>Third Week</b>	=	=	Clips Clapyron equation	=	=
<b>Fourth Week</b>	=	=	Ideal solutions-Rault's law-Henry's law	=	=
<b>Fifth Week</b>	=	=	True solutions and diffraction	=	=
<b>Sixth Week</b>	=	=	Associative qualities - low vapor pressure and high boiling point	=	=
<b>Seventh Week</b>	=	=	Decrease in freezing degree - osmotic pressure	=	=
<b>Eighth Week</b>	=	=	Distribution law	=	=
<b>Ninth Week</b>	=	=	Free energy and chemical equilibria General expression	=	=
<b>Tenth Week</b>	=	=	Finding the Equilibrium Constant for Homogeneous Gaseous Reactions	=	=
<b>Eleventh Week</b>	=	=	Equilibrium constant in liquid solutions	=	=
<b>Twelfth Week</b>	=	=	Balance constant for heterogeneous reactions	=	=
<b>Thirteenth Week</b>	=	=	Effect of temperature on chemical equilibrium	=	=
<b>Fourteenth Week</b>	=	=	Statistical Thermodynamics - Boltzmann's Law of Distribution	=	=
<b>Fifteenth Week</b>	=	Knowing the level of students	examine	=	Paper-based exam



82. Infrastructure	
11- Required textbooks	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
12- Key References (Sources)	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
13- Recommended books and references (scientific journals, reports ,.....)	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
14- Electronic references, websites ,.....	Any available references

83. Course Development Plan
<ul style="list-style-type: none"> <li>*Conducting seminars for students</li> <li>* Benefiting from the websites of discreet international universities in the field of physical chemistry to keep pace with the modernization of the curriculum and its latest developments.</li> </ul>

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

84. Educational Institution	University of Wasit - College of Science
85. Scientific Department/ Center	Department of Chemistry Sciences
86. Course Name / Code	Mathematics / Stage 2
87. Available attendance forms	In-Person
88. Semester/year	2023-2024
89. Number of study hours (total)	2 hours per week
90. Date this description was prepared	
91. Course Objectives	
1- Teaching students how to solve differential equations	
2- Teaching students how to solve first-order and homogeneous differential equations	
3- Teaching students how to solve matrices and Kramer's rule	

### 92. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

A1- In order for students to learn the basics of differential equations, matrices or determinants and their applications

#### B - Course Skills Objectives

B1- He learns a skill in order for students to learn the basics of differential equations and matrices or determinants and their applications

Teaching and learning methods
Lecture -Group Discussion -Questions and Answers
Evaluation methods
Lecture - Monthly Quizzes - Snap Quizzes
Teaching and learning methods
Lecture -Group Discussion -Questions and Answers
Evaluation methods
Lecture - Monthly Quizzes - Snap Quizzes
(d) Transferred general and qualifying skills (other skills related to employability and personal development). D1- Enhancing the student's self-confidence and breaking the barrier of fear and shyness by involving him in the discussions that revolve around the topic of the lecture, and this leads to a kind of development in his personality.

93. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2 Hours	Introduction to Ordinary Differential Equations	Introduction to Ordinary Differential Equations	Course	Response-Discussion-Testing
Second	2 Hours	Grade and Rank in Differential Equations	Grade and Rank in Differential Equations	Course	Response-Discussion-Testing
Third	2 Hours	First-order differential equations	First-order differential equations	Course	Response-Discussion-Testing
Fourth	2 Hours	First-class applications and exercises	First-class applications and exercises	Course	Response-Discussion-Testing
Fifth	2 Hours	Separation of variables from differential equations	Separation of variables from differential equations	Course	Response-Discussion-Testing
Sixth	2 Hours	Exercises on separating variables	Exercises on separating variables	Course	Response-Discussion-Testing
Seventh	2 Hours	Finding the General Solution to Differential Equations	Finding the General Solution to Differential Equations	Course	Response-Discussion-Testing
Eighth	2 Hours	First Exam	Test	---	---
Ninth	2 Hours	Homogeneous Differential Equations	Homogeneous Differential Equations	Course	Response-Discussion-Testing
Tenth	2 Hours	Apps & Exercises on Homogeneous	Apps & Exercises on Homogeneous	Course	Response-Discussion-Testing
Eleventh	2 Hours	Introduction to Matrices and Determinants	Introduction to Matrices and Determinants	Course	Response-Discussion-Testing
Twelfth	2 Hours	Applications and exercises about matrices and their types	Applications and exercises about matrices and their types	Course	Response-Discussion-Testing
Thirteen	2 Hours	Kramer's rule for matrices	Kramer's rule for matrices	Course	Response-Discussion-Testing

fourteenth	2 Hours	Apps on Kramer Base	Apps on Kramer Base	Course	Response-Discussion-Testing
Fifteenth	2 Hours	Second Exam	Test	----	“Sandeep!”

#### 94. Infrastructure

15- Required textbooks	
16- Key References (Sources)	Differential equations – ordinary differential equations solutions and applications by Dr. Ismael Buwaqfa –and Dr. Ayesh Al-Hanadwa
17- Recommended books and references (scientific journals, reports ,.....)	We recommend using international scientific journals that are published in global repositories such as scopus, web of science, wiley, springer
18- Electronic references, websites ,.....	Use of some global websites Use of some special software

#### 95. Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

96. Educational Institution	University of Wasit - College of Science
97. Scientific Department/ Center	Department of Chemistry Sciences
98. Course Name / Code	English / Phase II
99. Available attendance forms	
100. Semester/year	2023-2024
101. Number of study hours (total)	2 hours per week
102. Date this description was prepared	
103. Course Objectives	
4- Teaching students the processes of corrosion of metals and corrosion cells	
5- Teaching students' electrochemical chain and cathodic protection	
6- Teaching students the types of inhibitors of erosion and their impact on erosion	

### 104. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

- A1- In order for students to learn the basics of erosion and galvanic cells
- A2- For students to learn the basics of cathodic protection and inhibitors
- A3- In order to learn the calculations of erosion

#### B - Course Skills Objectives

- A1- In order for students to learn the basics of erosion and galvanic cells
- B2- In order for students to learn the basics of cathodic protection and inhibitors
- B3- In order to learn the calculations of erosion

Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

Evaluation methods
Lecture - Monthly Quizzes - Snap Quizzes
Teaching and learning methods
Lecture -Group Discussion -Questions and Answers
Evaluation methods
Lecture - Monthly Quizzes - Snap Quizzes
<p>(d) Transferred general and qualifying skills (other skills related to employability and personal development).</p> <p>D1-Enhancing the student's self-confidence and breaking the barrier of fear and shame by involving him in the discussions that revolve around the topic of the lecture and this leads to a kind of development in his personality</p>

105.Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2 Hours	Introduction to Corrosion of Metals	Introduction to Corrosion of Metals	Course	Response-Discussion-Testing
Second	2 Hours	The basics of corrosion of metals	The basics of corrosion of metals	Course	Response-Discussion-Testing
Third	2 Hours	Requirements for corrosion cells	Requirements for corrosion cells	Course	Response-Discussion-Testing
Fourth	2 Hours	Types of erosion	Types of erosion	Course	Response-Discussion-Testing
Fifth	2 Hours	Electrochemical chain	Electrochemical chain	Course	Response-Discussion-Testing
Sixth	2 Hours	Forms of erosion	Forms of erosion	Course	Response-Discussion-Testing
Seventh	2 Hours	First Exam	First Exam	---	---
Eighth	2 Hours	Introduction to Cathodic Protection	Introduction to Cathodic Protection	Course	Response-Discussion-Testing
Ninth	2 Hours	Its methods and types	Its methods and types	Course	Response-Discussion-Testing
Tenth	2 Hours	Applied current method	Applied current method	Course	Response-Discussion-Testing
Eleventh	2 Hours	Sacrificial Anodes Method	Sacrificial Anodes Method	Course	Response-Discussion-Testing
Twelfth	2 Hours	Cathodic Protection Design and Calculations	Cathodic Protection Design and Calculations	Course	Response-Discussion-Testing
Thirteen	2 Hours	Inhibitors and corrosion reduction	Inhibitors and corrosion reduction	Course	Response-Discussion-Testing
fourteenth	2 Hours	Types and methods of inhibitors	Types and methods of inhibitors	Course	Response-Discussion-Testing
Fifteenth	2 Hours	Second Exam	Second Exam	----	“Sandeep!”



106. Infrastructure	
19- Required textbooks	
20- Key References (Sources)	Corrosion Protection -Laith Ghanem Cathodic protection
21- Recommended books and references (scientific journals, reports ,.....)	We recommend using international scientific journals that are published in global repositories such as Scopus, web of science, widely, springer
22- Electronic references, websites ,.....	Use of some global websites Use of some special software

107. Course Development Plan	
We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines	

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

108. Educational Institution	University of Wasit - College of Science
109. Scientific Department/ Center	Department of Chemistry Sciences
110. Course Name / Code	Pollution and Occupational Safety/ Phase II
111. Available attendance forms	
112. Semester/year	2023-2024
113. Number of study hours (total)	2 hours per week
114. Date this description was prepared	
115. Course Objectives	
7- <b>To communicate information to the student about pollution of all kinds and its reduction, as well as about occupational safety in chemical laboratories or industrial facilities</b>	

116. Course Outcomes and Teaching, Learning and Evaluation Methods	
A- Knowledge Objectives	A1- To communicate information to the student about pollution of all kinds and its reduction, as well as about occupational safety in chemical laboratories or industrial facilities
B - Course Skills Objectives	To communicate information to the student about pollution of all kinds and its reduction, as well as about occupational safety in chemical laboratories or industrial facilities
Teaching and learning methods	
Lecture -Group Discussion -Questions and Answers	
Evaluation methods	
Lecture - Monthly Quizzes - Snap Quizzes	

C- Emotional and value objectives:

Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

Evaluation methods

Lecture - Monthly Quizzes - Snap Quizzes

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Enhancing the student's self-confidence and breaking the barrier of fear and shyness by involving him in the discussions that revolve around the topic of the lecture, and this leads to a kind of development in his personality.

117.Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2 Hours	Introduction to Pollution	Introduction to Pollution	Lecture	Response-Discussion-Testing
Second	2 Hours	Types of pollution	Types of pollution	Lecture	Response-Discussion-Testing
Third	2 Hours	Air pollution	Air pollution	Lecture	Response-Discussion-Testing
Fourth	2 Hours	water pollution	water pollution	Lecture	Response-Discussion-Testing
Fifth	2 Hours	soil contamination	soil contamination	Lecture	Response-Discussion-Testing
Sixth	2 Hours	Radiation Contamination	Radiation Contamination	Lecture	Response-Discussion-Testing
Seventh	2 Hours	Noise pollution	Noise pollution	Lecture	Response-Discussion-Testing
Eighth	2 Hours	First Exam	First Exam	---	---
Ninth	2 Hours	Introduction to Occupational Safety	Introduction to Occupational Safety	Lecture	Response-Discussion-Testing
Tenth	2 Hours	Definitions of Occupational Safety	Definitions of Occupational Safety	Lecture	Response-Discussion-Testing
Eleventh	2 Hours	Safety Objectives	Safety Objectives	Lecture	Response-Discussion-Testing
Twelfth	2 Hours	Safety Procedures	Safety Procedures	Lecture	Response-Discussion-Testing
Thirteen	2 Hours	Prevention and its types	Prevention and its types	Lecture	Response-Discussion-Testing
fourteenth	2 Hours	Work Medicine and Ambulance	Work Medicine and Ambulance	Lecture	Response-Discussion-Testing
Fifteenth	2 Hours	Second Exam	Second Exam	----	“Sandeep!”

118.Infrastructure	
15- Required textbooks	
16- Key References (Sources)	<b>Environmental Pollution Sources and Types- Journal of Technical Sciences Occupational Safety and Health -Dr. Khalid Ahmed Hazza</b>
S) Recommended books and references (scientific journals, reports ,.....)	We recommend using international scientific journals that are published in global repositories such as scopus, web of science, wiely, springer
T) Electronic references, websites ,.....	Use of some global websites Use of some special software

U) Course Development Plan
We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

## Description of the Academic Program- Phase III

### Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

120. Educational Institution	University of Wasit - College of Science
121. Scientific Department/ Center	Department of Chemistry Sciences
122. Course Name / Code	Organic Chemistry/ Phase III
123. Available attendance forms	Classroom Attendance
124. Semester/year	First and Second Semesters - 2023/2024
125. Number of study hours (total)	90
126. Date this description was prepared	
127. Course Objectives	
7. Highlight the importance of organic chemistry and its applications	
8. Identify the most important features of organic chemistry	
9. The student learned all about the interactions and mechanisms of different reactions, and the naming of organic compounds	
10. Students should get acquainted with stereochemistry and the most important concepts it deals with	
11. Students should have a strong base in organic chemistry that enables them to study advanced in this field	
12. Learn about the most important organic applications	

128. Course Outcomes and Teaching, Learning and Evaluation Methods

### A- Knowledge Objectives

- A1- Identifying the concept of acidity and the formation of salts for phenols and carboxylic acids
- A2- Using alcohol oxidation methods to prepare aldehydes and ketones
- A3-Knowledge of chiral centers, counterparts and optical opposites, naming R,S in stereochemistry
- A4-The use of the Kreinhard reagent and the Hale-Volhard-Sielsensky reactions in the preparation of carboxylic acids
- A5- Hoffmann segmentation reaction mechanism
- A6. Reactions of diazonium salts

### B - Course Skills Objectives

- B1- To know how the different reactions work by knowing the mechanics of the reaction
- B2 - Students learn different ways to prepare organic compounds
- B3- Identifying the importance of organic compounds and their impact on the environment and human life
- B4-Linking the theoretical aspect with the practical aspect in the study of organic chemistry

### Teaching and learning methods

- 1: Lecture Method and Using the Interactive Whiteboard
- 2: Explanation, clarification and discussion
- 3: Providing students with the basics and additional topics related to the outputs of thinking
- 4: Forming panel discussions to discuss topics that require reflection, analysis and conclusion
- 5: Brainstorming by asking reflective questions during the lecture
- 6: Giving the student assignments that require explanations and causal methods
- 7: Understanding and continuous communication with the ideas presented during the lecture.

### Evaluation methods

- 1: Practical tests
- 2: Theoretical test
- 3: Standardized tests (monthly) – assignments – surprise exams
- 4: Numbers of studies

### C- Emotional and value objectives:

- C1- Knowledge Enhancement
- C2-Promotingteamwork

### Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

### Evaluation methods

Practical tests - theoretical tests -discussion

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Knowledge Skills Remembering and Analyzing

D2- Training skills on extracting information from solid sources

D3- Skills for conducting chemical reactions and acquiring technical skills

D4- Self-learning and time management skills



## 129.Course Structure

### First Semester

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	3	Understand and learn scientific skills in thinking and creativity	Carboxylic acids (introduction, nomenclature, physical properties)	Lecture and Discussion	Tests of all kinds and asking questions
Second	3	Learn how to conduct chemical reactions and their mechanics	Methods of preparing carboxylic acids	Lecture and Discussion	Tests of all kinds and asking questions
Third	3	Learn how to conduct chemical reactions and their mechanics	Carboxylic Acid Reactions	Lecture and Discussion	Tests of all kinds and asking questions
Fourth	3	Understanding scientific concepts	Carboxylic acid derivatives (general introduction)	Lecture and Discussion	Tests of all kinds and asking questions
Fifth	3	Learn how to conduct chemical reactions and their mechanics	Carboxylic acid derivatives (preparation and reactions)	Lecture and Discussion	Tests of all kinds and asking questions
Sixth	3	Understanding scientific concepts	Amines (Introduction, Types of Amines, Naming, Formation of Salts and Basal)	Lecture and Discussion	Tests of all kinds and asking questions
seventh	3	Learn how to conduct chemical reactions and their mechanics	Physical Properties of Amines, Industrial and Laboratory Preparation	Lecture and Discussion	Tests of all kinds and asking questions
Eighth	3	Learn how to conduct chemical reactions and their mechanics	Amines Interactions	Lecture and Discussion	Tests of all kinds and asking questions
Ninth	3	Understanding scientific concepts	Ariel halide (subject introduction, physical properties, nomenclature)	Lecture and Discussion	Tests of all kinds and asking questions

Tenth	3	Learn how to conduct chemical reactions and their mechanics	Aryl halide (preparation methods)	Lecture and Discussion	Tests of all kinds and asking questions
Eleventh	3	Learn how to conduct chemical reactions and their mechanics	Aryl halide (reactions)	Lecture and Discussion	Tests of all kinds and asking questions
Twelfth	3	Understanding scientific concepts	Stereochemistry (subject introduction, chiral center, polar and anti-optical)	Lecture and Discussion	Tests of all kinds and asking questions
Thirteen	3	Understanding scientific concepts	Stereochemistry	Lecture and Discussion	Tests of all kinds and asking questions
fourteenth	3	Understanding scientific concepts	Stereochemistry (polarization, racemic mix, mesocomposites)	Lecture and Discussion	Tests of all kinds and asking questions
fifteenth	3	-----	The Tryout.	-----	Tests of all kinds
<b>Second Semester</b>					
<b>First</b>	3	Understanding scientific concepts	Phenols (Introduction, Naming, Physical Properties)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Second</b>	3	Learn how to conduct chemical reactions and their mechanics	Phenols (Methods of preparation)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Third</b>	3	Learn how to conduct chemical reactions and their mechanics	Phenols Interactions?	Lecture and Discussion	Tests of all kinds and asking questions
<b>Fourth</b>	3	Understanding scientific concepts	Carpathians I (Introduction, Naming, Physical Properties)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Fifth</b>	3	Learn how to conduct chemical reactions and their mechanics	Preparation methods	Lecture and Discussion	Tests of all kinds and asking questions

<b>Sixth</b>	3	Learn how to conduct chemical reactions and their mechanics	Carpathians I (Reactions)	Lecture and Discussion	Tests of all kinds and asking questions
<b>seventh</b>	3	Understanding scientific concepts	Carpathians I (Introduction, Naming, Physical Properties)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Eighth</b>	3	Learn how to conduct chemical reactions and their mechanics	Carpathians II Preparation methods	Lecture and Discussion	Tests of all kinds and asking questions
<b>Ninth</b>	3	Learn how to conduct chemical reactions and their mechanics	Carpathians II Interactions	Lecture and Discussion	Tests of all kinds and asking questions
<b>Tenth</b>	3	Understanding scientific concepts	Unsaturated alpha-beta carbon compounds (Introduction, Naming, Physical Properties)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Eleventh</b>	3	Learn how to conduct chemical reactions and their mechanics	Unsaturated alpha-beta carbon compounds (Methods of preparation)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Twelfth</b>	3	Understanding scientific concepts	Polycyclic aromatic compounds (Classification, naming, physical properties)	Lecture and Discussion	Tests of all kinds and asking questions
<b>Thirteen</b>	3	Learn how to conduct chemical reactions and their mechanics	Polycyclic aromatic compounds (preparation methods and reactions)	Lecture and Discussion	Tests of all kinds and asking questions
<b>fourteenth</b>	3	Understanding scientific concepts	Heterocyclic compounds	Lecture and Discussion	Tests of all kinds and asking questions
<b>Fifteenth</b>	3	----	The Tryout.	----	Tests of all kinds
130.Infrastructure					

131.Required textbooks	<b>Organic Chemistry Dr. Kamal Rashid Al-Jurani</b>
132.Key References (Sources)	1-Morrison and boyd (Org. Sixth Edition. Volume 2. 2-Mc Murry (Org. Chem.)7 <sup>th</sup> Ed. 3-Organic Chemistry/Eighth Edition L.G. Wade, JR./2013/ Whitman college
133.Recommended books and references (scientific journals, reports ,.....)	
134.Electronic references, websites ,.....	Use of some global websites Use of some special software

#### 135.Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

4. Course Structure Lab					
Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 <sup>st</sup>	3	Laboratory safety	Practical Organic chemistry	Blended learning	Daily exam and discussion
2 <sup>nd</sup>	3	Cannizaro Reaction	Practical Organic chemistry	Blended learning	Daily exam and discussion
3 <sup>rd</sup>	3	Preparation of Acetic Acid	Practical Organic chemistry	Blended learning	Daily exam and discussion
4 <sup>th</sup>	3	Preparation of Ethyl benzoate	Practical Organic chemistry	Blended learning	Daily exam and discussion
5 <sup>th</sup>	3	Preparation of N-benzyl phthalimide	Practical Organic chemistry	Blended learning	Daily exam and discussion
6 <sup>th</sup>	3	Aldol Condensation	Practical Organic chemistry	Blended learning	Daily exam and discussion
7 <sup>th</sup>	3	Friedel-Crafts reaction	Practical Organic chemistry	Blended learning	Daily exam and discussion
8 <sup>th</sup>	3	Azo dye	Practical Organic chemistry	Blended learning	Daily exam and discussion
9 <sup>th</sup>	3	Reduction of Azo dye	Practical Organic chemistry	Blended learning	Daily exam and discussion
10 <sup>th</sup>	3	Saponification	Practical Organic chemistry	Blended learning	Daily exam and discussion
11 <sup>th</sup>	3	Preparation of Iodobenzene	Practical Organic chemistry	Blended learning	Daily exam and discussion
12 <sup>th</sup>	3	Preparation of Acetanilide	Practical Organic chemistry	Blended learning	Daily exam and discussion

<b>13 th</b>	<b>3</b>	preparation of p-nitro acetanilide	Practical Organic chemistry	Blended learning	Daily exam and discussion
<b>14 th</b>	<b>3</b>	preparation of p-nitro aniline	Practical Organic chemistry	Blended learning	Daily exam and discussion
<b>15 th</b>	<b>3</b>	Examinations	Practical Organic chemistry	Blended	Daily exam and discussion  Daily exam and discussion  Daily exam and discussion  Month exam

### 5. Course Evaluation

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

### 6. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry / Part Two / Dr. Kamal Rashid Al-Jourani
Main references (sources)	1- Morrison and Boyd (Org. Chem.), sixth edition, Volume 2. 2- McMurry (Org. Chem.), 7th Ed.
Recommended books and references (scientific journals, reports...)	Organic Chemistry (8th Edition) by L. G. Wade Jr: Books, Whitman College.
Electronic References, Websites	<a href="https://cdnsciencepub.com/journal/cjc">https://cdnsciencepub.com/journal/cjc</a> <a href="https://pubs.acs.org/journal/jocea">https://pubs.acs.org/journal/jocea</a>

<https://www.sciencedirect.com/search?q=Escherichia%20coli&show=25&sortBy=relevance>

### Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

132. Educational Institution	University of Wasit - College of Science
133. Scientific Department/ Center	Chemistry
134. Course Name / Code	Physical Chemistry – Phase III– Prof. Dr.Sarah Badri Jasim
135. Available attendance forms	In-Person
136. Semester/year	2023-2024
137. Number of study hours (total)	0.50 mL/hr
138. Date this description was prepared	
139. Course Objectives	
4- Introducing the student to what physical chemistry is.	
5- Teach students how to link this branch of chemistry with other branches of chemistry and how to benefit from it.	
6- The student should learn the skills for solving problems and ideas in this specialization.	

140. Course Outcomes and Teaching, Learning and Evaluation Methods

A- Knowledge Objectives

A1-Knowledge of the basics of kinetic chemistry

A2-Knowledge of the basics of electrochemistry

A3-Expanding the understanding of the topics to include the kinetic theory of molecules.

A4-A brief study on photochemistry

B - Course Skills Objectives

B1- Logical thinking and solving mathematical problems.

B2- Identify the laws of physical chemistry and their basis.

B3- Apply the knowledge they have studied in the form of problems they solve.

Teaching and learning methods

4- Classic ways of meeting and asking questions.

5- Submit assignments.

6- Effective Communication

Evaluation methods

4- Monthly exams

5- Assignment work

6- Daily pop quizzes

C- Emotional and value objectives:

C1-Training students in deduction methods and scientific knowledge

C2-Training students in the simulation method

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Using modern methods of teaching

D2- Relying on modern sources to fold capabilities



141.Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
<b>First Semester</b>					
<b>First Week</b>	3	Learn the principles of the laws of mobility	Introduction to Kinetic Chemistry	Lecture	Answering questions in the lecture + surprise daily exams
<b>Second Week:</b>	=	Knowledge of scientific facts	Reaction mattresses and half-life	=	=
<b>Third Week</b>	=	=	Chain Reactions	=	=
<b>Fourth Week</b>	=	=	Activated Complex Theory	=	=
<b>Fifth Week</b>	=	=	Transition State Theory	=	=
<b>Sixth Week</b>	=	=	Enzyme kinetics	=	=
<b>Seventh Week</b>	=	=	Introduction to Gases	=	=
<b>Eighth Week</b>	=	=	Kinetic theory of gases	=	=
<b>Ninth Week</b>	=	=	Molecular Collisions	=	=
<b>Tenth Week</b>	=	=	Introduction to Gases	=	=
<b>Eleventh Week</b>	=	=	Kinetic theory of gases	=	=
<b>Twelfth Week</b>	=	=	Molecular Collisions	=	=
<b>Thirteenth Week</b>	=	=	Surface chemistry	=	=
<b>Fourteenth Week</b>	=	=	Adsorption isotherms	=	=
<b>Fifteenth Week</b>	=	Knowing the level of students	examine	=	Paper-based exam
<b>Second Semester</b>					
<b>First Week</b>	3	Knowledge of scientific facts	Introduction and Introductions to Electrochemistry	Lecture	Answering questions in the lecture + surprise daily exams
<b>Second Week:</b>	=	=	Faraday's Electrical Laws	=	=

<b>Third Week</b>	=	=	ELECTRIC CONNECTION	=	=
<b>Fourth Week</b>	=	=	Finding the Disintegration Constant from Conductivity Measurements	=	=
<b>Fifth Week</b>	=	=	Measuring the solubility constant of low-solubility salts from conductivity	=	=
<b>Sixth Week</b>	=	=	Kohlrausch Law for Independent Migration	=	=
<b>Seventh Week</b>	=	=	Moving Boundary Limit Method	=	=
<b>Eighth Week</b>	=	=	Definition of cells and electrodes	=	=
<b>Ninth Week</b>	=	=	Types of electrodes	=	=
<b>Tenth Week</b>	=	=	Power cells. They're coming.	=	=
<b>Eleventh Week</b>	=	=	Colloidal Solutions	=	=
<b>Twelfth Week</b>	=	=	photochemistry	=	=
<b>Thirteenth Week</b>	=	=	Energy according to Einstein's concept	=	=
<b>Fourteenth Week</b>	=	=	Products	=	=
<b>Fifteenth Week</b>	=	Knowing the level of students	examine	=	Paper-based exam

#### 142. Infrastructure

19. Required textbooks	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
20. Key References (Sources)	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
21. Recommended books and references (scientific journals, reports ,.....)	Atkins in Physical Chemistry and Alberty in Physical Chemistry Modern Edition.
22. Electronic references, websites ,.....	Any available references

#### 143..Course Development Plan

- \*Conducting seminars for students
- \* Benefiting from the websites of discreet international universities in the field of physical chemistry to keep pace with the modernization of the curriculum and its latest developments.

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

### Course Description

144. Educational Institution	University of Wasit - College of Science
145. Scientific Department/ Center	Department of Chemistry Sciences
146. Course Name / Code	Symmetrical Chemistry, Phase III
147. Available attendance forms	In-Person
148. Semester/year	First and second semesters of 2023-2024
149. Number of study hours (total)	Two hours for the theoretical part and three hours for the practical part

150. Date this description was prepared

### 151. Course Objectives

19. Introduction to the branches of chemistry in general and coordination chemistry in particular.
20. Know the oxidation states of the transition elements from the periodic table.
21. Complex definition, consistency setting
22. Understand the rule of effective atomic number.
23. Understanding orbital equivalence theory of complexes.
24. Understanding symmetry for complexes.
25. Understand the special molecular orbital theory of complexes.
26. Understand the crystal field theory.
27. Stand on the chemistry of the first, second, third and fourth transition series.
28. Identify the chemistry of internal transition elements (lanthans and actins).

### 152. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

10. Knowledge of the science of harmonic chemistry.
11. the chemistry of the key transition elements adequately.
12. The chemistry of the internal transition elements is adequate.
13. Solid-state chemistry for transition complexes.
14. Conjugation theories, including the crystal field theory, the molecular orbital theory and the valence nucleus theory.

#### B - Course Skills Objectives

12. To know the origin of the cohesion theories of chemical complexes.
13. Hybridization and expected geometry of molecules and solid-state study of ionic and covalent compounds
14. Interactions of the 3d group elements and preparation of their compounds.
15. Interactions of the elements of the group 4d, 5d and 6d and the preparation of their compounds.
16. Interactions of the elements of the group 4f , and 5f and the preparation of their compounds.

#### Teaching and learning methods

- 7 Using paper lectures.
- 8 The available means of presentation, for example, the presentation and also the blackboard.

9 Using video for lectures and also for experiments within the curriculum.

#### Evaluation methods

15. Participate in lectures orally (oral examinations).
16. Weekly assignments.
17. Monthly tests.
18. Additional scientific activities.
19. Periodic scientific reports.
20. Adopting the method of scientific discussion.
21. Annual Tests.

C- Emotional and value objectives:

- 5 Adopting the lecture method, scientific questions and answers, and the interaction between the student and the professor
- 6 Preparing scientific reports on the scientific method

#### Teaching and learning methods

- 1 Use paper lectures.
- 2 Available means of illustration, such as presentation and blackboard
- 3 Using video for lectures and also for experiments within the curriculum

#### Evaluation methods

1. Participate in lectures orally (oral examinations).
2. Weekly Assignments.
3. Monthly tests.
4. Additional scientific activities
5. Periodic scientific reports.
6. Adopting the method of scientific discussion.
7. `Annual Tests.

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

7. Expanding the student's scientific perceptions and making him engage in university life.
8. Extracting information from more than one scientific source and not relying on one single source.
9. Working in a team spirit and positive scientific cooperation among students.  
How to prepare monthly and final reports for the scientific material

### 153.Course Structure

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	2 theoretica 1+3 practical	Introduction to Incoordinate Chemistry + Manganese Chemistry	Introduction about Coordination Chemistry	Google meet and google class	Homework and test
2	2 theoretica 1+3 practical	Oxidation states of key transition elements + iron chemistry	Oxidation states for transition elements	Google meet and google class	Homework and test
3	2 theoretica 1+3 practical	Oxidation states of transition elements + cobalt chemistry	Oxidation states for transition elements	Google meet and google class	Homework and test
4	2 theoretica 1+3 practical	Effective atomic number base + nickel chemistry	Effective atomic number rule	Google meet and google class	Homework and test
5	2 theoretica 1+3 practical	Equivalence bonding theory + copper chemistry	Valance bond theory	Google meet and google class	Homework and test
6	2 theoretica 1+3 practical	Equivalence bonding theory + zinc chemistry	Valance bond theory	Google meet and google class	Homework and test
7	2 theoretica 1+3 practical	Molecular Orbital Theory + Silver Chemistry	Molecular orbital theory	Google meet and google class	Homework and test
8	2 theoretica 1+3 practical	Crystal field theory + Gold chemistry	Crystal field theory	Google meet and google class	Homework and test
9	2 theoretica 1+3 practical	First Transition Series + Platinum Chemistry	3d series chemistry	Google meet and google class	Homework and test
10	2 theoretica 1+3 practical	Second Transition Series + Cadmium Chemistry	4d series chemistry	Google meet and google class	Homework and test
11	2 theoretica	Third Transition Series +	5d series chemistry	Google meet and google class	Homework and test

	1 + 3 practical	Palladium Chemistry			
12	2 theoretica 1 + 3 practical	4th Transition Series + Mercury Chemistry	6d series chemistry	Google meet and google class	Homework and test
13	2 theoretica 1 + 3 practical	Chemistry of lanthanate elements + chemistry of cerium element	Lanthanoids chemistry	Google meet and google class	Homework and test
14	2 theoretica 1 + 3 practical	Actin Chemistry + Cer Chemistry	Actinoids chemistry	Google meet and google class	Homework and test
15	2 theoretica 1 + 3 practical	Organometallic complexes + Frocin complex	Organometallic chemistry	Google meet and google class	Homework and test

#### 154. Infrastructure

21. Required textbooks	Inorganic chemistry, Missler and Tarr
22. Key References (Sources)	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
q. Recommended books and references (scientific journals, reports, .....	Inorganic chemistry, James E. House Inorganic chemistry, Willer, Rock and Armstrong
k. Electronic references, websites .....	Royal Chemical Society

#### 155. Course Development Plan

Relying on the latest and updated lectures and scientific content

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

Course Structure Lab					
Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 st	3	Laboratory safety	Practical coordination	Blended	Daily exam and
2 nd	3	Introduction in coordination chemistry	Practical coordination chemistry	Blended learning	Daily exam and discussion
3 rd	3	Chemistry of Vanadium	Practical coordination chemistry	Blended learning	Daily exam and discussion
4 th	3	Preparation of Ammonium bis-oxalatovanadyl(IV)hydrate	Practical coordination chemistry	Blended learning	Daily exam and discussion
5 th	3	Preparation of Vanadium Acetylacetonate	Practical coordination chemistry	Blended learning	Daily exam and discussion
6 th	3	Chemistry of Chromium	Practical coordination chemistry	Blended learning	Daily exam and discussion
7 th	3	Preparation of Potassium Tris Oxalato chromate (III). hydrate	Practical coordination chemistry	Blended learning	Daily exam and discussion
8 th	3	Preparation of Cis potassium diaqua bisoxalato chromate (III) complex	Practical coordination chemistry	Blended learning	Daily exam and discussion
9 th	3	Preparation of Trans potassium dioxalato diaquo chromate (III) complex	Practical coordination chemistry	Blended learning	Daily exam and discussion
10 th	3	Chemistry of Nickel	Practical coordination chemistry	Blended learning	Daily exam and discussion
11 th	3	Preparation of Prepare of Hexa ammine Nickel (II) chloride	Practical coordination chemistry	Blended learning	Daily exam and discussion
12 th	3	Preparation of Nickel dimethylglyoxime	Practical coordination chemistry	Blended learning	Daily exam and discussion
13 th	3	Chemistry of Iron	Practical coordination chemistry	Blended learning	Daily exam and discussion



<b>`14 th</b>	<b>3</b>	Preparation of Potassium trisoxalato ferrate (III) trihydrate	Practical coordination chemistry	Blended learning	Daily exam and discussion
<b>15 th</b>	<b>3</b>	Examination	Practical Organic chemistry	Blended	Month exam

### Course Description

156. Educational Institution	University of Wasit - College of Science
157. Scientific Department/ Center	Department of Chemistry Sciences
158. Course Name / Code	Industrial Chemistry/ Phase III
159. Available attendance forms	Classroom Attendance
160. Semester/year	First and Second Semesters - 2023/2024
161. Number of study hours (total)	60
162. Date this description was prepared	
163. Course Objectives	
	13. Highlighting the importance of industrial chemistry and its applications
	14. Identify the most important features of industrial chemistry
	15. To know the methods of industrial chemistry assessment
	16. Identify the mechanism of preparing the energy and material balance
	17. Identify the physical and chemical operating units
	18. Identify the most important industrial applications

164. Course Outcomes and Teaching, Learning and Evaluation Methods

**A- Knowledge Objectives**

- A1- Identify the basic concepts of the chemical industries
- A2- Identification of physical processes and operation of industrial units
- A3- Identification of chemical process units and equipment
- A4- Identifying the types of energy and fuels used in industry
- A5- Applications of basic concepts in the Iraqi chemical industry
- A6- Identifying and reducing corrosion processes in the chemical, oil and water treatment industries in the industry

**B - Course Skills Objectives**

- B1 - Recognize Facts and Laws
- B2- Identification of types of industrial equipment
- B3- Identification of Physical Processes
- B4- Identification of Chemical Processes

**Teaching and learning methods**

- 1: Lecture Method and Using the Interactive Whiteboard
- 2: Explanation, clarification and discussion
- 3: Providing students with the basics and additional topics related to the outputs of thinking
- 4: Forming panel discussions to discuss topics that require reflection, analysis and conclusion
- 5: Brainstorming by asking reflective questions during the lecture
- 6: Giving the student assignments that require explanations and causal methods

**Evaluation methods**

- 1: Practical tests
- 2: Theoretical tests
- 3: Daily pop quizzes
- 4: Duties and reports
- 5: Prepare studies

**C- Emotional and value objectives:**

- C1- Knowledge Enhancement
- C2-Promoting teamwork

**Teaching and learning methods**

Lecture -Group Discussion -Questions and Answers

**Evaluation methods**

Practical tests - theoretical tests -discussion

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Knowledge and Memory Skills

D2- Reminder and Analysis Skills

D3- Effective communication skills and teamwork

D4- Self-learning and time management skills

165. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2	Learn, assimilate and perceive	Advantages of the chemical industry - Transformation-Efficiency -Outcome	Lecture and Discussion	Tests of all kinds and asking questions
Second	2	Understand and learn the basic starter	Mass and Heat Balancing Operations for Industrial Processes	Lecture and Discussion	Tests of all kinds and asking questions
Third	2	Learning scientific principles and laws	Transmission of freedom conduction-load-radiation	Lecture and Discussion	Tests of all kinds and asking questions
Fourth	2	Understanding scientific concepts	Heat Transfer Applications – Heat Exchangers	Lecture and Discussion	Tests of all kinds and asking questions
Fifth	2	Understanding scientific concepts	Fumigation operations - types - specifications - obstacles	Lecture and Discussion	Tests of all kinds and asking questions
Sixth	2	Understanding scientific concepts	Drying Operations - Drying Rate - Drying Devices	Lecture and Discussion	Tests of all kinds and asking questions
Seventh	2	Understanding scientific concepts	Industrial crystal - crystal growth rate - influencing factors	Lecture and Discussion	Tests of all kinds and asking questions
Eighth	2	Understanding scientific concepts	Industrial Distillation Operations - Distillation Device Types	Lecture and Discussion	Tests of all kinds and asking questions
Ninth	2	Understanding scientific concepts	Liquid-Liquid Extraction Processes – Factors Affecting	Lecture and Discussion	Tests of all kinds and asking questions
Tenth	2	Understanding scientific concepts	Fluid-Solid Processes and Influencing Factors	Lecture and Discussion	Tests of all kinds and asking questions
Eleventh	2	Understanding scientific concepts	Absorption processes - the use of absorption in industry	Lecture and Discussion	Tests of all kinds and

					asking questions
Twelfth	2	Understanding scientific concepts	Crushing Operations - Volumetric Filtration and Separation Operations	Lecture and Discussion	Tests of all kinds and asking questions
Thirteen	2	Understanding scientific concepts	Reactors - Homogeneous and Heterogeneous Reactions	Lecture and Discussion	Tests of all kinds and asking questions
Fourteenth	2	Understanding scientific concepts	Fluid reactions and their reactants - (gas-solid) reactions	Lecture and Discussion	Tests of all kinds and asking questions
Fifteenth	2	Understanding scientific concepts	Balancing Mass and Heat in Industrial Processes	Lecture and Discussion	Tests of all kinds and asking questions
Sixteenth	2	Understanding scientific concepts	Fuel - Solid Fuel - Coal Analysis	Lecture and Discussion	Tests of all kinds and asking questions
Seventeenth	2	Understanding scientific concepts	Liquid fuels - gaseous fuels - types and methods of production	Lecture and Discussion	Tests of all kinds and asking questions
Eighteenth	2	Understanding scientific concepts	Water sources - softening methods - water tests	Lecture and Discussion	Tests of all kinds and asking questions
Nineteenth	2	Understanding scientific concepts	Cement - Production methods - Reactions in the rotary kiln	Lecture and Discussion	Tests of all kinds and asking questions
Twenty	2	Understanding scientific concepts	Glass - Raw materials - Types of chemical reactions	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-first	2	Understanding scientific concepts	Sulfuric Acid - Contact Method and Lead Chambers	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-second	2	Understanding scientific concepts	Nitric Acid - Preparation of Acid - Mechanics of Reactions	Lecture and Discussion	Tests of all kinds and asking questions

Twenty-third	2	Understanding scientific concepts	Chemical Fertilizers - Ammonium Nitrate - Urea Fertilizer	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-fourth	2	Understanding scientific concepts	Production of mono-bi-triple superphosphate fertilizer	Lecture and Discussion	Tests of all kinds and asking questions
The twenty-fifth	2	Understanding scientific concepts	Production of Ammonium Phosphate Fertilizer - Super Ammonium Phosphate	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-sixth	2	Understanding scientific concepts	Sugar production from cane and sugar beets	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-seventh	2	Understanding scientific concepts	Paper Production - Paper Pulp Preparation Methods	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-eighth	2	Understanding scientific concepts	Rubber industry	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-ninth	2	Understanding scientific concepts	Corrosion and Reduction in Petroleum Industries	Lecture and Discussion	Tests of all kinds and asking questions
30th	2	-----	The Tryout.	Lecture and Discussion	Tests of all kinds and asking questions

## 166. Infrastructure

23. Required textbooks	Foundations of Industrial Chemistry (Dr. Aziz Ahmed Amin) Chemical process industry (N. Sharef)
142.Key References (Sources)	Foundations of Industrial Chemistry (Dr. Aziz Ahmed Amin)
L. Recommended books and references (scientific journals, reports ,.....)	

M. Electronic references, websites  
,.....

Use of some global websites  
Use of some special software

### 167. Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

<b>168. Educational Institution</b>	University of Wasit - College of Science
<b>169. Scientific Department/ Center</b>	Chemistry
<b>170. Course Name / Code</b>	Biochemistry/Phase III
<b>171. Available attendance forms</b>	Personally
<b>172. Semester/year</b>	2023-2024
<b>173. Number of study hours (total)</b>	4 Hours
<b>174. Date this description was prepared</b>	
<b>175. Course Objectives</b>	

### 176. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

A1- To deliver information to the student about the vital elements and to know the vital components of the human body and to know how to demolish and build the elements inside the body to obtain the vital energy needed by man

#### B - Course Skills Objectives

B1 - To communicate information to the student about the vital elements, knowledge of the vital components of the human body and knowledge of metabolism within the body

#### Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

#### Evaluation methods



Monthly Quizzes and Snap Quizzes
Teaching and learning methods
Lecture -Group Discussion -Questions and Answers
Evaluation methods
Monthly Quizzes and Snap Quizzes

177. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2	Introduction to Cell Structure	Introduction to the Cell	Course	Response-Discussion-Testing
Second	2	Glycolysis	glycolysis	Course	Response-Discussion-Testing
Third	2	Kerbs cycle	Kerbs cycle	Course	Response-Discussion-Testing
Fourth	2	Claycogen Synthesis	Claycogen Synthesis	Course	Response-Discussion-Testing
Fifth	2	Claycogen Demolition	Claycogen Demolition	Course	Al Akhnabar - Discussion
Sixth	2	Building glycose	Building glucose	Course	Testing and Discussion
Seventh	2	First Exam	First Exam	....	.....
Eighth	2	Amino Acids	Recognize their nature	Course	Testing and Discussion
Ninth	2	Nucleic Acids	Introducing to:	Course	Testing and Discussion
Tenth	2	Nucleic Acids	Introducing to:	Course	Testing and Discussion
Eleventh	2	Enzyme	Know the types of enzymes	Course	Testing and Discussion
Twelfth	2	Nucleotides	Nucleotides	Course	Testing and Discussion
Thirteen	2	Endocrine System	Knowing the locations of the glands and their importance	Course	Testing and Discussion
Fourteenth	2	Hormones	Knowing their types	Course	Testing and Discussion
Fifteenth	2	Second Exam	Second Exam	.....	.....

(d) Transferred general and qualifying skills (other skills related to employability and personal development).  
D1- Enhancing the student's self-confidence and breaking the barrier of fear and shame by involving him in discussions

178. Infrastructure	
143.Required textbooks	
144.Key References (Sources)	Lippincott and Stennaria
N. Recommended books and references (scientific journals, reports ,.....)	We recommend using international journals published in Scopus repositories
O. Electronic references, websites ,.....	Use of some sites such as Kokol Schooler

179. Course Development Plan
There are plans to develop the course by adding recent studies published in international journals

1 <sup>st</sup>	2	Introducing the student to biochemistry, biomolecules and their importance	The importance of biochemistry	Direct education Paper	Daily exam and discussion
2 <sup>nd</sup>	2	Introducing the student to the division of carbohydrates	Types of carbohydrate	lectures Direct education	Daily exam and discussion
3 <sup>rd</sup>	2	Introducing the student to quantitative tests for carbohydrates	Quantitative tests for detection of carbohydrates	Paper lectures and practical application	Daily exam and discussion
4 <sup>th</sup>	2	Molish test	Molish test for carbohydrate detect	Direct education Paper and practical education	Daily exam and discussion
5 <sup>th</sup>	2	Definition of student seliwanoff test	Seliwanoff test	Paper lectures and practical application	Daily exam and discussion
6 <sup>th</sup>	2	Student definition of the Benedict test	Benedict test	lectures and practical application	Daily exam and discussion
7 <sup>th</sup>	2	Student definition of the Barfoed test	Barfoed test	Direct education Paper lectures and practical application	Mid- term exam
8 <sup>th</sup>	2				

9 <sup>th</sup>	2	Student definition of the Bial test  Student definition of the osazone test	Bial test  Osazone test	lectures and practical application  Direct education Paper lectures	Daily exam and discussion  Daily exam and discussion
10 <sup>th</sup>	2	Student definition of the Iodine test	Iodine test	Direct education Paper lectures	Daily exam and discussion
11 <sup>th</sup>	2	Student definition of analysis of starch through salt	Hydrolysis of starch by salt	Direct education Paper lectures	Daily exam and discussion
12 <sup>th</sup>	2	presented by the student about one of the previous topics he studied	presented by the student	data show	Scientific discussion
13 <sup>th</sup>	2	Introducing the student to the importance of carbohydrates	The importance of carbohydrate	Direct education Paper lectures	writing a report
14 <sup>th</sup>	2	Reference to the article	Reference to the article	Discussion	Daily exam and discussion
15 <sup>th</sup>	2	Exam	Exam	Direct education	

				Paper lectures	Month exam
<b>1. Course Evaluation</b>					
Distributing the score out of 100 % ( Theoretical lectures + lab works) according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, lab works, reports ... etc					
<b>2. Learning and Teaching Resources</b>					
Required textbooks (methodology, if any)			Lippincott s book		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			<a href="http://www.chemicalprocessing.com">www.chemicalprocessing.com</a>		
Electronic References, Websites					

### Academic Program Description

This course description provides a necessary summary of the most important characteristics of the courses and the learning outcomes expected of the student to be achieved, proving whether he has achieved the maximum benefit from the available education and must be linked to the description of the program.

<b>1. Educational institution</b>	University of Wasit - College of Science
<b>2. Scientific Department/ center</b>	Chemistry
<b>3. Course Name / Code</b>	Nano chemistry
<b>4. Available attendance forms</b>	In-Person
<b>5. Term/ Year</b>	2023-2024
<b>6. Number of study hours</b>	2hours

**7. Date this description was prepared**

**8. Course objectives:**

- 1-The student should be aware of the meaning of nanostructured materials**
- 2-The student should distinguish between types of nanomaterials**
- 3-The student should know the applications of materials with a general nanostructure**
- 4-The student should know the applications of nanostructured materials in the medical field**
- 5-The student should know the devices for measuring and examining nanomaterials**
- 6-The student should distinguish between methods of manufacturing nanostructured materials**
- 7-The student should know the effect of the size of the materials on the physical and chemical properties**
- 8-The student should know diagnostic imaging and drug delivery using nanotechnology**
- 9-The student should understand the importance of converting the drug to nanoscale**

**9- Required program outcomes and teaching, learning and evaluation methods**

**A. Knowledge objectives**

- A1- The student can distinguish between nanomaterials and microstructures**
- A2- The student can understand the types of nanomaterials**
- A3- The student can explain the mechanism of work of nanomaterials examination and measurement devices**
- A4-The student can understand the applications of physical and chemical nanomaterials**
- A5-The student can understand the applications of nanomaterials in medical fields**
- A6-The student can explain diagnostic imaging and drug delivery using nanotechnology**
- A7-The student can determine the importance of converting the drug to the nanoscale**

## **B- Skills objectives of the program**

**B1- The student can find the physical and chemical properties of nanomaterials**

**B2- The student can find the appropriate way to convert any material to nanoscale**

**B3- The student can find the optimal type of nanomaterials for any medical application**

**B4- The student can find the optimal type of nanomaterial for any treatment used**

## **Teaching and learning methods**

- 1. Discussion Guide**
- 2. Student Groups**
- 3. Scientific trips**
- 4. E-Learning On-Campus**
- 5. Demonstration Experiences**
- 6. Workshops**

## **Evaluation methods**

- 1. Scientific Reports**
- 2. Oral Tests are**
- 3. Written quizzes**
- 4. Direct questions**

## **C. Emotional and value objectives**

**C1- The student can harness his concepts of nanomaterials in scientific applications**

**C2- The student can compare the types of nanomaterials**

**C3- The student can harness the properties of nanomaterials in medical applications**

## **Teaching and learning methods**

- 7. Discussion Guide**
- 8. Student Groups**
- 9. Scientific trips**
- 10. E-Learning On-Campus**
- 11. Demonstration Experiences**



## 12. Workshops

### Evaluation methods

5. Scientific Reports
6. Oral Tests are
7. Written quizzes
8. Direct questions

### C. Emotional and value objectives

- C1- The student can harness his concepts of nanomaterials in scientific applications**  
**C2- The student can compare the types of nanomaterials**  
**C3- The student can harness the properties of nanomaterials in medical applications**

### Teaching and learning methods

1. Discussion Guide
2. Student Groups
3. Scientific trips
4. E-Learning On-Campus
5. Demonstration Experiences

### Evaluation methods

1. Scientific Reports
2. Oral Tests are
3. Written quizzes
4. Direct questions

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

**D1- Verbal Communication -**

**D2- Ability to express ideas clearly and confidently in speech**

**D3- Teamwork.**

## 10. Structure of the Academic Program

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2 theoretical	The student is introduced to nanotechnology	<b>Introduction to Nano- Science</b>		Method of giving lectures Discussion method
Second	2 theoretical	Explains to the student the types of nanomaterials	<b>Types of Nano-particles</b>		Theoretical lectures
Third	2 theoretical	Explains to the student the properties of nanomaterials	<b>Nano- Materials Properties</b>		E-learning and presentation experiences
Fourth	2 theoretical	Explains to the student how the size of materials affects properties	<b>How nano-Size Affects Properties</b>		Method of giving lectures Student groups
Fifth	2 theoretical	The student learns about methods of manufacturing nanomaterials	<b>Nano-Partials Fabrication Methods</b>		Method of giving lectures Student groups
Sixth	2 theoretical	The student is introduced to devices for examining and measuring nanomaterials	<b>Nano-Partials Measurement and Spectroscopy</b>		Theoretical lectures
Seventh	2 theoretical	-	<b>First Exam</b>	-	-
Eighth	2 theoretical	Shows the student the applications of nanomaterials	<b>Nano- Materials Applications</b>		E-learning and presentation experiences
Ninth	2 theoretical	Explains to the student the medical applications of nanomaterials	<b>Medical Applications of Nano- Materials</b>		Method of giving lectures Discussion method
Tenth	2 theoretical	The student learns about the relationship between medicine and nanoscience	<b>Nano-Biotechnology</b>		Method of giving lectures Discussion method
Eleventh	2 theoretical	The student learns about the relationship of	<b>Nano-biosensors</b>		E-learning and presentation experiences

		biological sensors to nanoscience		
Twelfth	2 theoretical	Explains to the student the function and importance of implanting nanomaterials on the surface of biological materials	<b>Nano-functionalization of surfaces with biomolecules</b>	E-learning and presentation experiences
Thirteenth	2 theoretical	-	<b>Second Exam</b>	-
fourteenth	2 theoretical	Explains to the student the principles and importance of diagnostic imaging	<b>Diagnostic Imaging</b>	Theoretical lectures
Fifteenth	2 theoretical	Explains to the student how to communicate the function and importance of nano-sized drug delivery	<b>Drug Delivery &amp; Loading Drugs Into Nano-Particles</b>	E-learning and presentation experiences

## 11. Structure of the Academic Program

### a- Required textbooks

### lectures

- Vollath D. **Nanomaterials. Wiley-Vch; 2013.**
- Hornyak GL, Tibbals HF, Dutta J, Moore JJ. **Fundamentals of nanotechnology. CRC press; 2008 Dec 22.**

**Cataldo, Franco, and Tatiana Da Ros, eds. Medicinal chemistry and pharmacological potential of fullerenes and carbon nanotubes. Vol. 1. Springer Science+Business Media, LLC 2011**

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

We recommend using international journals published in Scopus repositories

M. Electronic references, websites ,.....

Internet

## 12- Course development plan

**1- Conducting research and reports on topics**

**2- Application**

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

180. Educational Institution	University of Wasit - College of Science
181. Scientific Department/ Center	Department of Chemistry Sciences
182. Course Name / Code	English Language/ Stage 3

183. Available attendance forms	
184. Semester/year	First and Second Semesters - 2023/2024
185. Number of study hours (total)	60 hours
186. Date this description was prepared	
187. Course Objectives	
19. To know the wording of the questions	
20. Enhancing the ability to speak, read and write	
21. Chronological Recognition	
22. How to speak English	

188. Course Outcomes and Teaching, Learning and Evaluation Methods
<p><b>A- Knowledge Objectives</b></p> <p>A1- How to formulate questions</p> <p>A2- Building knowledge to enhance the ability to listen and speak</p> <p>A3- Using the times in the right way</p>
<p><b>B - Course Skills Objectives</b></p> <p>B1- Enhancing and building the skill of listening</p> <p>B2 – Enhance reading and speaking skills</p> <p>B3 – Develop the ability to speak English and use common vocabulary at the time of speaking</p>
Teaching and learning methods
<p>1: Listening</p> <p>2: Reading and Writing</p> <p>3. Talk</p> <p>4: Vocabulary Usability Development</p>

Evaluation methods
1: Practical tests 2: Theoretical tests 3: Daily pop quizzes 4: Duties and Creation Writing
C- Emotional and value objectives: C1- Knowledge Enhancement C2-Promotingteamwork
Teaching and learning methods
Lecture -Group Discussion -Questions and Answers
Evaluation methods
Practical tests - theoretical tests -discussion
(d) Transferred general and qualifying skills (other skills related to employability and personal development). D1- Knowledge and Memory Skills D2- Dialogue skills D3- Speaking time vocabulary skills D4- Self-learning skills.

189. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2	Learn, assimilate and perceive	Tenses-Auxiliary verbs	Lecture and Discussion	Tests of all kinds and asking questions
Second	2	Learn, assimilate and perceive	Introduction- Question Forms- Common Mistakes- Vocabulary- Every day English	Lecture and Discussion	Tests of all kinds and asking questions
Third	2	Learn, assimilate and perceive	Reading, Speaking and Writing	Lecture and Discussion	Tests of all kinds and asking questions
Fourth	2	Learn, assimilate and perceive	Present tenses	Lecture and Discussion	Tests of all kinds and asking questions
Fifth	2	Learn, assimilate and perceive	Passive and Active Voice	Lecture and Discussion	Tests of all kinds and asking questions
Sixth	2	Learn, assimilate and perceive	Free time activity- Making small talk	Lecture and Discussion	Tests of all kinds and asking questions
Seventh	2	Learn, assimilate and perceive	Past tenses	Lecture and Discussion	Tests of all kinds and asking questions
Eighth	2	Learn, assimilate and perceive	Spelling and pronunciation	Lecture and Discussion	Tests of all kinds and asking questions
Ninth	2	Learn, assimilate and perceive	Giving options	Lecture and Discussion	Tests of all kinds and asking questions
Tenth	2	Learn, assimilate and perceive	Modal verbs	Lecture and Discussion	Tests of all kinds and asking questions
Eleventh	2	Learn, assimilate and perceive	Phrasal and related verbs	Lecture and Discussion	Tests of all kinds and asking questions
Twelfth	2	Learn, assimilate and perceive	Polite request and offers	Lecture and Discussion	Tests of all kinds and asking questions
Thirteen	2	Learn, assimilate and perceive	Future forms, may-may-could	Lecture and Discussion	Tests of all kinds and asking questions
fourteenth	2	Learn, assimilate and perceive	Word building- Arranging to meet	Lecture and Discussion	Tests of all kinds and asking questions
fifteenth	2	Learn, assimilate and perceive	Information questions	Lecture and Discussion	Tests of all kinds and asking questions
Sixteenth	2	Learn, assimilate and perceive	Adjective and adverbs	Lecture and Discussion	Tests of all kinds and asking questions
Seventeenth	2	Learn, assimilate and perceive	Present perfect-simple-	Lecture and Discussion	Tests of all kinds and asking questions

			continuous-passive		
Eighteenth	2	Learn, assimilate and perceive	Verbs patterns- Body Language- Travel and numbers	Lecture and Discussion	Tests of all kinds and asking questions
Twelfth	2	Learn, assimilate and perceive	Conditionals	Lecture and Discussion	Tests of all kinds and asking questions
Twenty	2	Learn, assimilate and perceive	Words with similar meaning	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-first	2	Learn, assimilate and perceive	Dealing with money	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-two	2	Learn, assimilate and perceive	Nouns phrases	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-three	2	Learn, assimilate and perceive	Nouns phrases	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-fourth	2	Learn, assimilate and perceive	Compound nouns	Lecture and Discussion	Tests of all kinds and asking questions
The twenty-fifth	2	Learn, assimilate and perceive	Compound nouns	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-sixth	2	Learn, assimilate and perceive	Modals of probability	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-seven	2	Learn, assimilate and perceive	Phrasal verbs	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-eighth	2	Learn, assimilate and perceive	Reported speech	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-nine	2	Learn, assimilate and perceive	Way of speaking	Lecture and Discussion	Tests of all kinds and asking questions
30th	2	-----	Test	Lecture and Discussion	Tests of all kinds and asking questions

## 190. Infrastructure

23. Required textbooks	New Head way Plus: John and Liz Soars For Third year class.
w. Key References (Sources)	New Head way Plus: John and Liz Soars For Third year class.
x. Recommended books and references (scientific journals, reports ,.....)	
y. Electronic references, websites ,.....	Use of some global websites Use of some special software

## 191. Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines



## Description of the Academic Program- Phase V

### Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

192. Educational Institution	University of Wasit - College of Science
193. Scientific Department/ Center	Chemistry
194. Course Name / Code	Quantum Chemistry and Spectroscopy/Stage 4
195. Available attendance forms	In-Person
196. Semester/year	Annual System for the Academic Year 2023-2024
197. Number of study hours (total)	3 hours
198. Date this description was prepared	
199. Course Objectives	
	1- Teaching students the foundations and concepts of quantum chemistry
	2- Studying old quantum theories and examples such as harmonic vibrator and solid rotor
	3- Identifying the theory of black body radiation and its role in quantum mechanics
	4- Introduction to the different mathematical expressions used to describe quantized atomic systems
	5- Study of wave mechanics according to the Schrödinger method
	6- Studying molecular applications such as the approximation of Born Oppenheimer and the approximation of the structure
	7- Studying spectra and their basics for atoms and molecules

200. Course Outcomes and Teaching, Learning and Evaluation Methods
<p>A- Knowledge Objectives</p> <p>A1- Theoretical calculations</p> <p>A2- Understanding the foundations of quantum mechanics</p> <p>A3- Application of these calculations and their relationship with other chemistry departments</p>
<p>B - Course Skills Objectives</p> <p>B1- Knowing the difference between the modern and the old quantity</p> <p>B2 – Difference between different electronic levels</p> <p>B3- Using mathematical equations to find the required variables</p>
Teaching and learning methods
<p>1- Course</p> <p>2- Explanatory Videos</p> <p>3- Panel Discussions</p>
Evaluation methods
<p>Monthly tests.</p> <p>2- Surprise tests</p>
<p>C- Emotional and value objectives:</p> <p>C1-Respect</p> <p>Discipline.</p> <p>Competition:</p>
Teaching and learning methods
<p>1- Lecture</p> <p>2- Explanatory Videos</p> <p>3- Panel Discussions</p>
Evaluation methods
<p>Monthly tests.</p> <p>Quizzes</p>
<p>(d) Transferred general and qualifying skills (other skills related to employability and personal development).</p> <p>Enhancing the student's self-confidence and practicing scientific thinking and conclusion.</p>

201. Course Structure					
Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
1	3	General Revision	EFFECTS	Lecture and Video	Testing and Discussion
2	3	Learn the scientific facts	Intrinsic value equations	=	=
3	3	=	Conservative Systems	=	=
4	3	=	Functions in the field of quantum	=	=
5	3	=	Lacrange function	=	=
6	3	=	Hamiltonian function	=	=
7	3	=	Quantum mechanical principles	=	=
8	3	=	Electron Diffraction Phenomenon	=	=
9	3	=	Spectral lines of atoms	=	=
10	3	=	Heisenberg's Inaccuracy Principle	=	=
11	3	=	Quantum Mechanics Hypotheses	=	=
12	3	=	Quantum mechanics of some systems	=	=
13	3	=	In a box.	=	=
14	3	=	Harmonic vibrator	=	=
15	3	=	Hydrogen atom	=	=
16	3	=	Approximate Methods	=	=
17	3	=	Helium	=	=
18	3	=	Journal of Molecular Structure	=	=
19	3	=	Molecular Theories	=	=
20	3	=	Equivalence Attachment Theory	=	=
21	3	=	Orbital Molecular Theory	=	=
22	3	=	Structure Theory	=	=
23	3	=	Molecular Spectra	=	=
24	3	=	energy rating	=	=
25	3	=	Spectrum Zones	=	=
26	3	=	Exam rules and regulations	=	=
27	3	=	Exposing Spectrum Lines	=	=
28	3	=	Microwave Spectroscopy	=	=
29	3	=	Raman Spectra	=	=
30	3	=	Electronic Spectra	=	=

202. Infrastructure	
29. Required textbooks	Quantum Chemistry Book (Dr. Muthanna Abdul Jabbar Shanshil) Available in the College Library Recording lectures and posting them on the YouTube channel
30. Key References (Sources)	-Physical Chemistry (Book by Atkins) -Advance Physical Chemistry (Book by Chhatwal Gurdeep Raj and Mehra Harish C) -Quantum Chemistry ( Donald A. McQuarrie)
z. Recommended books and references (scientific journals, reports ,.....)	International Publishing House Egyptian Researchers Scientific Journal Baghdad University
aa. Electronic references, websites ,.....	ISI Web of Science. Research Gate Chemistry Lab Students

203. Course Development Plan	
Allocating practical hours to perform calculations for quantum chemistry, which requires the presence of a special computer to do so	

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

204. Educational Institution	University of Wasit - College of Science
205. Scientific Department/ Center	Department of Chemistry Sciences
206. Course Name / Code	Petrochemicals and Polymers / Phase IV
207. Available attendance forms	Classroom Attendance
208. Semester/year	2023-2024
209. Number of study hours (total)	60
210. Date this description was prepared	
211. Course Objectives	
23. Identifying Crude Oil Types and Chemical Processes	
24. Identifying oil derivatives and their properties	
25. Identify the methods of chemical treatment - improvement - allergy - isomerization- polymerization - hydrogenation - thermal and catalytic cracking	
26. Identification of petrochemical compounds and methods of their preparation	
27. Identifying types of polymerizations and classification	
28. Identify polymerization methods and polymerization mechanism	

### 212. Course Outcomes and Teaching, Learning and Evaluation Methods

#### A- Knowledge Objectives

- A1- Identifying the composition and types of crude oil
- A2- Identifying the physical and transformational processes of crude oil
- A3- Identification of crude oil and products
- A4- Identifying petrochemicals and preparing them as intermediates in the production of polymers
- A5- Identifying polymerization methods and mechanisms
- A6

B - Course Skills Objectives

B1 - Recognize Facts and Laws

B2 – Identifying Transformational Processes

B3- Identification of Physical Processes

B4- Identification of polymerization methods and types

Teaching and learning methods

- 1: Lecture Method and Using the Interactive Whiteboard
- 2: Explanation, clarification and discussion
- 3: Providing students with the basics and additional topics related to the outputs of thinking
- 4: Forming panel discussions to discuss topics that require reflection, analysis and conclusion
- 5: Brainstorming by asking reflective questions during the lecture
- 6: Giving the student assignments that require explanations and causal methods

Evaluation methods

- 1: Practical tests
- 2: Theoretical tests
- 3: Daily pop quizzes
- 4: Duties and reports
- 5: Numbers of studies

C- Emotional and value objectives:

C1- Knowledge Enhancement

C2-Promoting teamwork

A3

A4

Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

Evaluation methods

Practical tests - theoretical tests -discussion

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Knowledge and Memory Skills

D2- Reminder and Analysis Skills

D3- Effective communication skills and teamwork

D4- Self-learning and time management skills

### 213.Course Structure

Week	Hours	Intended Learning Outcomes	Module / Course Name or	teaching method	Valuation Method
First	2	Learn, assimilate and perceive	Origin and stages of formation of crude oil	Lecture and Discussion	Tests of all kinds and asking questions
Second	2	Understand and learn the basic starter	Crude Oil Types - Crude Oil Components	Lecture and Discussion	Tests of all kinds and asking questions
Third	2	Learning scientific principles and laws	Physical properties of crude oil and its products	Lecture and Discussion	Tests of all kinds and asking questions
Fourth	2	Understanding scientific concepts	Physical properties of crude oil and its products	Lecture and Discussion	Tests of all kinds and asking questions
Fifth	2	Understanding scientific concepts	Crude oil numbers for refining operations	Lecture and Discussion	Tests of all kinds and asking questions
Sixth	2	Understanding scientific concepts	Atmospheric and vacuum distillation and solvent extraction processes	Lecture and Discussion	Tests of all kinds and asking questions
Seventh	2	Understanding scientific concepts	Alkylation Processes – Polymerization Processes	Lecture and Discussion	Tests of all kinds and asking questions
Eighth	2	Understanding scientific concepts	Catalytic Repairs - Installations	Lecture and Discussion	Tests of all kinds and asking questions
Ninth	2	Understanding scientific concepts	facilities -Crude oil and products	Lecture and Discussion	Tests of all kinds and asking questions
Tenth	2	Understanding scientific concepts	Additives to improve the properties of petroleum products	Lecture and Discussion	Tests of all kinds and asking questions
Eleventh	2	Understanding scientific concepts	Thermal Cracking - Theory - Thermal Cracking Mechanics	Lecture and Discussion	Tests of all kinds and asking questions
Twelfth	2	Understanding scientific concepts	Catalytic cracking - Mechanics of reactions - Comparisons	Lecture and Discussion	Tests of all kinds and asking questions

			between thermal and catalytic cracking		
Thirteen	2	Understanding scientific concepts	Petrochemicals derived from methane	Lecture and Discussion	Tests of all kinds and asking questions
fourteenth	2	Understanding scientific concepts	Petrochemicals derived from ethane	Lecture and Discussion	Tests of all kinds and asking questions
fifteenth	2	Understanding scientific concepts	Propane-derived petrochemicals	Lecture and Discussion	Tests of all kinds and asking questions
Sixteenth	2	Understanding scientific concepts	Petrochemicals derived from aromatics	Lecture and Discussion	Tests of all kinds and asking questions
seventeenth	2	Understanding scientific concepts	Polymers - Definitions - Molecular Forces in Polymers	Lecture and Discussion	Tests of all kinds and asking questions
Eighteenth	2	Understanding scientific concepts	Classification and labeling of polymers	Lecture and Discussion	Tests of all kinds and asking questions
Nineteenth	2	Understanding scientific concepts	Types of molecular weight - additives - types of initiators	Lecture and Discussion	Tests of all kinds and asking questions
Twenty	2	Understanding scientific concepts	Inhibitors and disruptors in polymerization processes	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-first	2	Understanding scientific concepts	Additive polymerization with free radicals of phenyl monomers and the effectiveness of monomers towards free radical polymerization	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-second	2	Understanding scientific concepts	Anionic polymerization of vinyl monomers and primers	Lecture and Discussion	Tests of all kinds and asking questions



Twenty-third	2	Understanding scientific concepts	Cationic polymerization of phenyl monomers and their precursors and factors affecting ionic polymerization	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-fourth	2	Understanding scientific concepts	Polymerization of step growth (condensation polymerization) - polyester - polyamides	Lecture and Discussion	Tests of all kinds and asking questions
The twenty-fifth	2	Understanding scientific concepts	Polycarbonate-Polyimide-Polybenzimidazole -Polybenzazole	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-sixth	2	Understanding scientific concepts	Formaldehyde resins (phenol formaldehyde-melamine formaldehyde-urea formaldehyde)	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-seventh	2	Understanding scientific concepts	Ring opening polymerization (ionic polymerization of cyclic ethers - cyclic amide polymerization)	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-eighth	2	Understanding scientific concepts	Ionic polymerization of lactones and silicones	Lecture and Discussion	Tests of all kinds and asking questions
Twenty-nine	2	Understanding scientific concepts	Harmonic polymerization	Lecture and Discussion	Tests of all kinds and asking questions
Thirtieth	2	-----	The Tryout.	Lecture and Discussion	Tests of all kinds and asking questions
214.Infrastructure					

31. Required textbooks	Petroleum refinery (N. Nelson) Oil Technology: Dr. Bassila Ibrahim Macromolecular Chemistry: Dr. Dhnoon Mohammed Aziz , DZ Korkis Abdul Al Adam
32. Key References (Sources)	Oil Technology: Dr. Bassila Ibrahim Macromolecular Chemistry: Dr. Dhnoon Mohammed Aziz , DZ Korkis Abdul Al Adam
R. Recommended books and references (scientific journals, reports ,.....)	
E. Electronic references, websites ,.....	Use of some global websites Use of some special software

#### r. Course Development Plan

We have a plan to develop the curriculum by adding recent studies published in discreet international journals and magazines

## Course Description

This course outline provides a concise summary of the main features of the course and the expected learning outcomes for students, demonstrating whether they have achieved maximum benefit from the available learning opportunities. It must be linked to the description of the program.

216. Educational Institution	University of Wasit - College of Science
217. Scientific Department/ Center	Chemistry
218. Course Name / Code	Biochemistry/Stage 4
219. Available attendance forms	In-Person
220. Semester/year	2023-2024
221. Number of study hours (total)	4 Hours
222. Date this description was prepared	
223. Course Objectives	
1- Teaching students the theoretical foundations of biochemistry	
2- Teaching students how to study proteins and enzymes	
3- Studying the kinetics of enzymes and knowing their types	
4. Hormone study	

224. Course Outcomes and Teaching, Learning and Evaluation Methods

A- Knowledge Objectives

A1- To communicate information to the student about the vital elements and knowledge of the vital components of the human body

B - Course Skills Objectives

B1 - To communicate information to the student about the vital elements and to know the vital components of the human body

Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

Evaluation methods

Monthly Quizzes and Snap Quizzes

Teaching and learning methods

Lecture -Group Discussion -Questions and Answers

Evaluation methods

Monthly Quizzes and Snap Quizzes

Week	Hours	Intended Learning Outcomes	teaching method	Valuation Method
First	2	Introduction to Biochemistry	Lecture	Response-Discussion-Testing
Second	2	Blood draws and blood precipitators	Lecture	Response-Discussion-Testing
Third	2	Blood draws and blood precipitators	Lecture	Response-Discussion-Testing
Fourth	2	Sugars - Natural values of chemicals	Lecture	Response-Discussion-Testing
Fifth	2	Sugars and their analyzes	Lecture	Testing and Discussion
Sixth	2	Blood glucose	Lecture	Testing and Discussion
Seventh	2	Fat and Cholesterol Build and Demolish	Lecture	Testing and Discussion
Eighth	2	Fat and Cholesterol Build and Demolish	Lecture	Testing and Discussion
Ninth	2	Lipoproteins	Lecture	Testing and Discussion
Tenth	2	Proteins and Albumin	Lecture	Testing and Discussion
Eleventh	2	Proteins and kidney function	Lecture	Testing and Discussion
Twelfth	2	Enzyme	Lecture	Testing and Discussion
Thirteen	2	Enzymes and liver function	Lecture	Testing and Discussion
fourteenth	2	All electrolytes and salts	Lecture	Testing and Discussion
Fifteenth	2	First Quiz	Lecture	Testing and Discussion
Sixteenth	2	Enzymes, minerals and vitamins	Lecture	Testing and Discussion
Seventeenth	2	minerals and vitamins	Lecture	Testing and Discussion
Eighteenth	2	male hormones	Lecture	Testing and Discussion
Nineteenth	2	Female Hormones	Lecture	Testing and Discussion
Twentieth	2	Thyroid Hormones	Lecture	Testing and Discussion
Twenty-first	2	Thyroid and calcium hormones	Lecture	Testing and Discussion
Twenty-second	2	Pancreatic hormones	Lecture	Testing and Discussion

Twenty-third	2	Glandular Hormones	Lecture	Testing and Discussion
Twenty-fourth	2	Anterior Pituitary Hormones	Lecture	Testing and Discussion
Twenty-fifth	2	Revenue Analysis	Lecture	Testing and Discussion
Twenty-sixth	2	Revenue Analysis	Lecture	Testing and Discussion
Twenty-seventh	2	Exit Analysis	Lecture	Testing and Discussion
Twenty-eighth	2	Semen Analysis	Lecture	Testing and Discussion
Twenty-ninth	2	Gallstones, kidneys and urinary tract	Lecture	Testing and Discussion
Thirtieth	2	Second Quiz	Lecture	Testing and Discussion

(d) Transferred general and qualifying skills (other skills related to employability and personal development).

D1- Enhancing the student's self-confidence and breaking the barrier of fear and shame by involving him in discussions

225.Infrastructure	
33. Required textbooks	Biochemistry Part I and II by Dr.Tariq Younis Ahmed and Dr. Louay Abdul Ali Al-Hilali - University of Mosul
34. Key References (Sources)	Lippincott's book
L. Recommended books and references (scientific journals, reports ,.....)	We recommend using international journals published in Scopus repositories
M. Electronic references, websites ,.....	Use of some sites such as Kokol Schooler

#### 266. Course Development Plan

There are plans to develop the course by adding recent studies published in international journals

1. Course Name: Organic Spectroscopy	
2. Course Code: ORG SPECT	
3. Semester / Year: First semester/ 2023-2024	
4. Description Preparation Date: 1-9-2024	
5. Available Attendance Forms: Presence	
6. Number of Credit Hours (Total) 2 hours theoretical + 3 hours lab works/ Number of Units (Total)	
7. Course administrator's name (mention all, if more than one name) Name: Assist Prof Dr Jawad Kadhim Abaies Email: <a href="mailto:jabaies@uowasit.edu.iq">jabaies@uowasit.edu.iq</a>	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none"> <li>1–Raising the level of chemistry in all fields</li> <li>2–Transferring what is new about these sciences to serve society</li> <li>3–Raising the economic level of the country</li> <li>4–Providing relevant institutions and departments with technical and scientific graduates the new ones</li> <li>5– Joint cooperation with state institutions and the private sector for work scientific research to solve related problems</li> </ul>
9. Teaching and Learning Strategies	
Strategy	Following up on outstanding students, supporting them, and guiding them to build their mental and scientific abilities appropriately with their abilities and orientations in different specializations

<b>10. Course Structure</b>					
<b>Week</b>	<b>Hour</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>



1 <sup>st</sup>	2	Identification of organic compounds and its importance	Identification of organic compounds and its importance	Paper lectures	Daily exam and discussion
2 <sup>nd</sup>	2	Spectroscopy and electromagnetic spectrum	Spectroscopy and electromagnetic spectrum	Paper lectures	Daily exam and discussion
3 <sup>rd</sup>	2	UV-Visible Spectroscopy	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
4 <sup>th</sup>	2	Absorption of light by organic compound and UV-VIS spectrum	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
5 <sup>th</sup>	2	Chromophore, Auxochrome and related terms	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
6 <sup>th</sup>	2	Types of bands in UV-VIS spectrum and factors affected on them	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
7 <sup>th</sup>	2	Effect of conjugation on UV-VIS spectra of dienes and conjugated systems	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
8 <sup>th</sup>	2	The Woodward–Fieser prediction rules of $\lambda_{max}$ for dienes and enones	UV-Visible Spectroscopy	Paper lectures	Daily exam and discussion
9 <sup>th</sup>	2	IR Spectroscopy and its importance	IR Spectroscopy	Paper lectures	Daily exam and discussion
10 <sup>th</sup>	2	Scientific principles of FTIR spectrum	IR Spectroscopy	Paper lectures	Daily exam and discussion
11 <sup>th</sup>	2	Types of Vibrations after IR absorption by molecule.	IR Spectroscopy	Paper lectures	Daily exam and discussion
12 <sup>th</sup>	2	Types, shapes and location of bands appear in FTIR Spectrum	IR Spectroscopy	Paper lectures	Daily exam and discussion
13 <sup>th</sup>	2	FTIR spectra analysis of various aliphatic compounds	IR Spectroscopy	Paper lectures	Daily exam and discussion
14 <sup>th</sup>	2	FTIR spectra analysis of various aromatic compounds	IR Spectroscopy	Paper lectures	Daily exam and discussion
15 <sup>th</sup>	2		Monthly Exam		Monthly Exam

		Monthly Exam			
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**11. Course Evaluation**

Distributing the score out of 100 % ( Theoretical lectures + lab works) according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, lab works, reports .... etc

**12. Learning and Teaching Resources**

Required textbooks (curricular books, if any)	Spectrometric Identification of Organic Compounds 8th Edition by Robert M. Silverstein, Francis X. Webster, David Kiemle, David L. Bryce
Main references (sources)	

Recommended books and references (scientific journals, reports...)	<p>1-Introduction to Spectroscopy by Donald L. Pavia , Gary M. Lampman &amp; George S . Kriz.</p> <p>2-Elementary Organic Spectroscopy “Principles and chemical Application by Y. R. Sharma, Chand and Company Ltd, New Delhi, India, 2009.</p>
Electronic References, Websites	

## 7. Course Structure

Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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1 <sup>st</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
2 <sup>nd</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
3 <sup>rd</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
4 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
5 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
6 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
7 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
8 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
9 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
10 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
11 <sup>th</sup>	3	Educate students detection of unknown organic substance	Identification of unknown organic substances	Practical application	Writing a report
12 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report

13 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
14 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	
	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
15 <sup>th</sup>	3	Monthly exam	Monthly exam	Monthly exam	Writing a report
					Writing a report
					Monthly exam

### 8. 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, lab works, reports.... etc.

### 3. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

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

The Systematic Identification of Organic Compounds by\_Ralph L. Shriner, Christine K. F. Hermann, Ternece C. Morrill, David Y. Curtin and Reynold C. Fuson

Electronic References, Websites	Practical Organic Chemistry by Arthur I. Vogel

9. Course Structure Lab					
Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	3	Educate students the systematic methods of organic identification	Systematic methods for organic identification	Paper lectures Direct education Paper lectures and practical application	Daily exam and discussion
2nd	3	Educate students the methods of physical properties measurements	Methods of physical properties measurements	Direct education Paper lectures and practical application	Daily exam and discussion
3rd	3	Educate students the method of detecting the elements by sodium fusion method	Detection of elements by sodium fusion method	Direct education Paper lectures and practical application	Daily exam and discussion
4th	3	Educate students the solubility of organic substances and solubility table	Solubility	Direct education Paper lectures and practical application	Daily exam and discussion
5th	3	Educate students the detection of functional groups, unsaturation, carboxylic acids, and phenols	Detection the functional group	Direct education Paper lectures and practical application	Daily exam and discussion
6th	3	Educate students the detection of alcohols, aldehydes and ketones	Detection the functional group	practical application	Daily exam and discussion

<b>7th</b>	<b>3</b>	Educate students the detection of carbohydrates, amines, and aromatic hydrocarbons	Detection the functional group	practical application	Daily exam and discussion
<b>8th</b>	<b>3</b>	Educate students searching for names of organic compounds using physical properties in literature	Searching names of organic compounds using physical properties in literature	practical application	Daily exam and discussion
<b>9th</b>	<b>3</b>	Educate students the identification of unknown organic substances	Identification of unknown organic substances	practical application	Daily exam, discussion and writing a report
<b>10th</b>	<b>3</b>	Educate students identification of unknown organic substances	Identification of unknown organic substances	practical application	writing a report
<b>11th</b>	<b>3</b>	Educate students identification of unknown organic substances	Identification of unknown organic substances	practical application	Writing a report
<b>12th</b>	<b>3</b>	Educate students identification of unknown organic substances	Identification of unknown organic substances	practical application	Writing a report
<b>13th</b>	<b>3</b>	Educate students identification of unknown organic substances	Identification of unknown organic substances	practical application	Writing a report
<b>14th</b>	<b>3</b>	Educate students identification of unknown organic substances	Identification of unknown organic substances	practical application	Writing a report
<b>15th</b>		Monthly Exam	Monthly Exam	Monthly Exam	Monthly Exam

## 10. Course Evaluation

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

### 11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	The Systematic Identification of Organic Compounds by Ralph L. Shriner, Christine K. F. Hermann, Ternece C. Morrill, David Y. Curtin and Reynold C. Fuson
Recommended books and references (scientific journals, reports...)	Practical Organic Chemistry by Arthur I. Vogel
Electronic References, Websites	

### 12. Course Structure Lab

Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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1 <sup>st</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
2 <sup>nd</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
3 <sup>rd</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
4 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
5 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
6 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
7 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
8 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
9 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
10 <sup>th</sup>	3	Educate students detection of unknown organic substance	Identification of unknown organic substances	Practical application	Writing a report
11 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
12 <sup>th</sup>	3	Educate students		Practical application	Writing a report

13 <sup>th</sup>	3	detection of unknown organic substances	Identification of unknown organic substances		
14 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
15 <sup>th</sup>	3	Educate students detection of unknown organic substances	Identification of unknown organic substances	Practical application	Writing a report
		Monthly exam	Monthly exam	Monthly exam	Monthly exam

### 13. 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, lab works, reports.... etc.

### 14. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	The Systematic Identification of Organic Compounds by_Ralph L. Shriner, Christine K. F. Hermann, Ternece C. Morrill, David Y. Curtin and Reynold C. Fuson
Recommended books and references (scientific journals, reports...)	Practical Organic Chemistry by Arthur I. Vogel
Electronic References, Websites	

1. Course Name: Automated analysis CHEMISTRY	
2. Course Code: ANALY CHEM	
3. Semester / Year: first semester/ 2023-2024	
4. Description Preparation Date: 1-9-2023	
5. Available Attendance Forms: Presence	
6. Number of Credit Hours (Total) 3 hours practical / Number of Units (Total)	
7. Course administrator's name (mention all, if more than one name) Name: Email: @uowasit.edu.iq	
8. Course Objectives	
Course Objectives	<p>1–Raising the level of chemistry science in all fields</p> <p>2– Transferring what is new about these sciences to serve society</p> <p>3–Raising the economic level of the country</p> <p>4– Providing relevant institutions and departments with technical and scientific graduates</p> <p>The new ones</p> <p>5– Joint cooperation with state institutions and the private sector for work</p> <p>Scientific research to solve related problems</p>
9. Teaching and Learning Strategies	
Strategy	1-Providing students with the theoretical basics of knowing chemical variables .

2- Practical training on calculating the absorbance of colored and transparent solutions .

## 10. Course Structure

Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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<b>1 st</b>	<b>3</b>	Introducing the student to the concepts of automated analysis .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>2 nd</b>	<b>3</b>	Student definition of spectrophotometer .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>3 rd</b>	<b>3</b>	Student definition of spectrophotometric determination of potassium dichromate .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>4 th</b>	<b>3</b>	Introducing the student to the quantitative and qualitative analysis of benzoic acid .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>5 th</b>	<b>3</b>	Introducing the student to the use of proportional methods in estimating the iron ion colorimetrically .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>6 th</b>	<b>3</b>	Introducing the student to the instantaneous determination of cobalt and nickel in a mixture using color spectroscopy	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>7 th</b>	<b>3</b>	Introducing the student to the colorimetric determination of manganese	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>8 th</b>	<b>3</b>	Student definition of Beer and Lambert law and deviations from it .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>9 th</b>	<b>3</b>	Introducing the student to the molar ratio method to estimate the ratio of ligand to metal .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>10 th</b>	<b>3</b>	Introducing the student to the method of continuous changes .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>11 th</b>	<b>3</b>	Introducing the student to the standard addition method .	Analytical chemistry	Paper lectures	Month exam

		<p>Introducing the student to the determination of potassium using flame spectroscopy</p> <p>The student's definition of conductive correction .</p> <p>Definition of the student's jihadist descension .</p> <p>examination</p>	biochemistry		
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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)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	<p><b>skoog analytical chemistry</b></p> <p><b>Principles of Instrumental Analysis</b></p>
Electronic References, Websites	

## 15. Course Structure Lab

Week	Hour	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 <sup>st</sup>	2	Introducing the student to the concepts of automated analysis .	Analytical chemistry	Paper lectures	Daily exam and discussion
2 <sup>nd</sup>	2	Student definition of spectrophotometer .	Analytical chemistry	Paper lectures	Daily exam and discussion
3 <sup>rd</sup>	2	Student definition of spectrophotometric determination of potassium dichromate .	Analytical chemistry	Paper lectures	Daily exam and discussion
4 <sup>th</sup>	2	Introducing the student to the quantitative and qualitative analysis of benzoic acid .	Analytical chemistry	Paper lectures	Daily exam and discussion
5 <sup>th</sup>	2	Introducing the student to the use of proportional methods in estimating the iron ion colorimetrically .	Analytical chemistry	Paper lectures	Daily exam and discussion
6 <sup>th</sup>	2	Introducing the student to the instantaneous determination of cobalt and nickel in a mixture using color spectroscopy	Analytical chemistry	Paper lectures	Daily exam and discussion
7 <sup>th</sup>	2	Introducing the student to the colorimetric determination of manganese	Analytical chemistry	Paper lectures	Daily exam and discussion
8 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion
9 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion
10 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion
11 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion
12 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion
13 <sup>th</sup>	2		Analytical chemistry	Paper lectures	Daily exam and discussion

<b>14 th</b>	Student definition of Beer and Lambert law and deviations from it .	Analytical chemistry	Paper lectures	Daily exam and discussion
<b>15 th</b>	Introducing the student to the molar ratio method to estimate the ratio of ligand to metal .	Analytical chemistry	Paper lectures	Month exam
	Introducing the student to the method of continuous changes .	Analytical chemistry		
	Introducing the student to the standard addition method .	Analytical chemistry		
	Introducing the student to the determination of potassium using flame spectroscopy	Analytical chemistry		
	The student's definition of conductive correction .	Analytical chemistry		
	Definition of the student's jihadist descension .	Analytical chemistry		
	examination			

## 16. 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

## 17. Learning and Teaching Resources

Required textbooks (curricular books, if any)

**Principles of Instrumental Analysis**



Main references (sources)	Analytical chemistry , <a href="https://www.sciencedirect.com/journal/journal-of-chromatography-a">https://www.sciencedirect.com/journal/journal-of-chromatography-a</a> <a href="https://www.sciencedirect.com/journal/trac-trends-in-analytical-chemistry">https://www.sciencedirect.com/journal/trac-trends-in-analytical-chemistry</a> <a href="https://cdnsiencepub.com/journal/cjc">https://cdnsiencepub.com/journal/cjc</a>
Recommended books and references (scientific journals, reports...)	<b>skoog analytical chemistry</b>
Electronic References, Websites	<a href="https://www.youtube.com/@khanacademy">https://www.youtube.com/@khanacademy</a>