

Republic of Iraq  
Ministry of Higher Education & Scientific Research  
Supervision and Scientific Evaluation Directorate  
Quality Assurance and Academic Accreditation

## Academic Program Specification Form For The Academic

University: University of Anbar  
College: College of Science  
Department: Chemistry  
department  
Date Of Form Completion : 24/1/2025

Professor Dr. Ismat Ramzy Abdel Ghafour

Professor Dr. Ahmed Salman Obaid

Prof. Dr. Hameed H. Ali

Dean's Name

Dean's Assistant  
For Scientific  
Affairs

Head of  
Department

Date: 23 / 6 /

Date: 24 / 6 / 2025  
Signature

Date: 22 / 6 / 2025

Signature

Signature

الاستاذ الدكتور  
حميد حسين علي  
رئيس قسم الكيمياء

د. أحمد خليل إبراهيم  
مسؤول شعبة ضمان الجودة وتقويم الأداء

Quality Assurance And University Performance  
Manager Date: / 22 / 6 / 2025  
Signature



# TEMPLATE FOR PROGRAMME SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Anbar
2. University Department/Centre	chemistry
3. Program Title	Bachelor
4. Title of Final Award	Bachelor - chemistry
5. Modes of Attendance offered	Semester
6. Accreditation	chemistry
7. Other external influences	Field work and scientific trips to rock outcrops , geological sites and institutions
8. Date of production/revision of this specification	<b>24-1-2025</b>
9. Aims of the Program	
Providing relevant institutions and departments with technical and scientific cadres of recent graduates.	

## **10. Learning Outcomes, Teaching, Learning and Assessment Methods**

### **A. Knowledge and Understanding**

A1. Choosing the best modern scientific methods in delivering information to students through a professional teaching staff.

A2. Providing students with scientific and practical chemistry experiences in all its branches through practical application in the department's laboratories and multiple field trips.

### **B. Subject-specific skills**

The department aims to graduate scientific cadres working in the following:

B 1. Health and educational institutions

B2. Develop the student's research and analytical ability.

B 3. Develop the deductive side of the students.

B4. Learn how to work with scientific instruments

### **Teaching and Learning Methods**

- Surprise daily tests (Quizzes) and weekly continuous exams.
- Practical exercises and activities in the classroom.
- Guiding students to scientific references to expand student's perceptions in understanding scientific courses.

### **Assessment methods**

- Participation in the classroom.
- Presentation of activities.
- Semester and final exams.

### **C. Thinking Skills**

C1. Develop the students ability to understand the specialization and deal with it flexibly

C2. Create a familiarity with branch applications.

C3. Responsibility in serving the community and the country through this scientific branch.

### **Teaching and Learning Methods**

- Managing the lecture on an applied and scientific approach in a way that can be understood and analyzed.
- Giving students some group activities and assignments.
- Allocate a percentage of grades for the daily assignment and activities.

### Assessment methods

- Active participation in the classroom is evidence of student commitment and responsibility.
- Commitment to deadlines for submitting assignments and research.
- The quarterly and final exams are an expression of commitments and cognitive and skill achievement.
- Applications, exercises and daily assignments.

General and Transferable Skills (other skills relevant to employability and personal development)

- D1. Develop the student ability to deal with technical means.
- D2. Develop the student ability to deal with internet.
- D3. Develop the student ability to deal with multimedia.
- D4. Develop the student ability to dialogue and discussion.

### Teaching and Learning Methods

- Presenting the courses in a clear and simplified manner with the use of correspondence and illustrative charts and presentation through the power point technique.
- Classroom and laboratory exercises and activities
- Weekly and quarterly assignments and reports.
- Guidance to scientific references to expand understanding of course details.
- Visits and field trips to work sites.

### Assessment Methods

- Surprise daily tests or exams (Quizzes).
- Participation in the classroom.
- Presentation of activities.
- Semester and final exams.

11. Program Structure				12. Awards and Credits
Level/Year	Course or Module Title	Creditrating		
		Theoretical	Practical	
1st	Descriptive Analytical Chemistry	2	2	Bachelor Degree Requires ( x ) credits
1st	General Physics	2	2	
1st	English Language	2	-	

1st	Mathematics	2	-
1st	Computer Science (1)	2	2
1st	Inorganic Chemistry (1)	2	-
1st	Human Rights	2	-
1st	Thermodynamic Physical Chemistry	2	3
1st	Structural Inorganic Chemistry	2	3
1st	Gravimetric Analysis	2	---
1st	Organic Chemistry (2)	2	3
1st	Calculus Equations (1)	2	3
1st	Computer Science (3)	2	---
1st	Environmental Chemistry (1)	2	3
2nd	Thermodynamic Physical Chemistry	2	2
2nd	Structural Inorganic Chemistry	2	2
2nd	Gravimetric Analysis	2	3
2nd	Organic Chemistry (2)	2	2
2nd	Calculus Equations (1)	2	
2nd	Computer Science (3)	2	2
2nd	Environmental Chemistry (1)	2	2
2nd	Equilibriums Physical Chemistry	2	2
2nd	Main-Group Elements Chemistry	2	2
2nd	Organic Chemistry (3)	2	2
2nd	Separation Methods	2	3
2nd	Environmental Chemistry (1)	2	2

2nd	Calculus Equations (2)	2	-
2nd	Computer Science (4)	2	2
2nd	English Language	2	-
3rd	Kinetic & Photochemistry	2	2
3rd	Coordination Chemistry (1)	2	2
3rd	Biochemistry (1)	2	2
3rd	Organic Chemistry (4)	2	2
3rd	Fundamentals of Industrial Chemistry	2	3
3rd	Petroleum Chemistry	2	---
3rd	Electric Chemistry	2	---
3rd	Coordination Chemistry (2)	2	2
3rd	Biochemistry (2)	2	2
3rd	Organic Chemistry (5)	2	2
3rd	Applications of Industrial Chemistry	2	-
3rd	Green Chemistry	2	---
4th	Spectroscopy Instrumental Analysis	2	2
4th	Biochemistry (3)	2	2
4th	Fundamental of Polymers	2	2
4th	Quantum Chemistry	2	-
4th	Identification of Organic Spectrum (1)	2	3
4th	Metallic Organic Chemistry	2	-

4th	English Language	2	-
4th	Electrical Instrumental Analysis	2	3
4th	Biochemistry (4)	2	---
4th	Petrochemical	2	---
4th	Spectrum Chemistry	2	-
4th	Identification of Organic Spectrum (2)	2	3
4th	Industrial Recovery	2	2
4th	Research Project	2	2

### 13. Personal Development Planning

Follow up, Support and guide outstanding students and build their mental and scientific capabilities in line with their abilities and orientations in different branches.

### 14. Admission criteria.

Students who graduate from the sixth middle school accept the biological or applied branch with a rate of at least 80 %, in addition to the possibility of private admission.

### 15. Key sources of information about the program

One of the most important sources of information for the study program is the reliance on curricula and courses recognized in faculties and scientific departments in European and American universities. In addition to communicating with institutions and state administrations that possess chemical cadres, to set study programs that contribute to the graduation of students with scientific and applied experiences, to work in relevant departments and institutions, as well as support graduate programs.

Curriculum Skills Map												
please tick in the relevant boxes where individual Program Learning Outcomes are covered												
Year / Level	Course Title	Core (C) Title or Option(O)	Knowledge and understanding				Subject-specific skills				Thinking Skills	
			A1	A2	A3	A4	B1	B2	B3	B4	C1	C2
			1st	Descriptive Analytical Chemistry	C	√				√		
	General Physics	C	√				√					
1st	English Language	C	√				√					
	Mathematics	C	√				√					
1st	Computer Science (1)	C	√				√					
	Inorganic Chemistry (1)	C	√				√					
1st	Human Rights	C	√				√					
	Thermodynamic Physical Chemistry	C	√	√			√	√			√	
1st	Structural Inorganic Chemistry	C	√				√				√	
	Gravimetric Analysis											
1st	Organic Chemistry (2)	C	√				√					
	Calculus Equations (1)											
1st	Computer Science (3)	C	√				√					
	Environmental Chemistry (1)											
1st	Thermodynamic Physical Chemistry	C	√				√					
	Structural Inorganic Chemistry											
1st	Gravimetric Analysis	C	√				√				√	
	Organic Chemistry (2)											
1st	Calculus Equations (1)	C	√								√	
	Computer Science (3)											
1st	Environmental Chemistry (1)	C	√				√					
	Equilibria Physical Chemistry											
	Main-Group Elements Chemistry											
	Organic Chemistry (3)											
2nd	Separation Methods	C	√	√			√	√			√	√
	Environmental Chemistry (1)											

2nd	Calculus Equations (2) Computer Science (4)	C	√				√						
2nd	English Language	C	√	√			√					√	
2nd	Kinetic & Photochemistry	C	√				√					√	
2nd	Coordination Chemistry (1) Biochemistry (1)	C	√				√						
2nd	Organic Chemistry (4) Fundamentals of Industrial Chemistry	C	√	√			√					√	
2nd	Petroleum Chemistry Electric Chemistry	C	√				√					√	
2nd	Coordination Chemistry (2) Biochemistry (2)	C	√				√					√	
2nd	Organic Chemistry (5) Applications of Industrial Chemistry	C	√				√					√	
2nd	Green Chemistry Spectroscopy Instrumental Analysis	C	√	√			√	√				√	√
2nd	Biochemistry (3) Fundamental of Polymers	C	√				√	√				√	
2nd	Quantum Chemistry Identification of Organic Spectrum (1)	C	√				√					√	
2nd	Metallic Organic Chemistry English Language	C	√				√						
	Electrical Instrumental Analysis Biochemistry (4)												
3rd	Petrochemical Spectrum Chemistry	C	√	√			√	√				√	√
3rd	Identification of Organic Spectrum (2) Industrial Recovery	C	√	√			√	√				√	√
3rd	Research Project Descriptive Analytical Chemistry	C	√	√			√	√				√	√
3rd	General Physics English Language	C	√				√					√	
3rd	Mathematics Computer Science (1)	C	√	√			√	√				√	√
3rd	Inorganic Chemistry (1) Human Rights	C	√				√	√				√	

3rd	Thermodynamic Physical Chemistry Structural Inorganic Chemistry	C	√				√					
3rd	Gravimetric Analysis Organic Chemistry (2)	C	√	√			√	√			√	√
3rd	Calculus Equations (1) Computer Science (3)	C	√	√			√	√			√	√
3rd	Environmental Chemistry (1) Thermodynamic Physical Chemistry	C	√	√			√	√			√	√
3rd	Structural Inorganic Chemistry Gravimetric Analysis	C	√				√				√	
3rd	Organic Chemistry (2) Calculus Equations (1)	C	√	√			√				√	
3rd	Computer Science (3) Environmental Chemistry (1)	C	√	√			√				√	
3rd	Equilibriums Physical Chemistry Main-Group Elements Chemistry	C	√	√			√	√			√	√
	Organic Chemistry (3) Separation Methods											
4th	Environmental Chemistry (1) Calculus Equations (2)	C	√	√			√	√			√	√
4th	Computer Science (4) English Language	C	√	√			√	√			√	√
4th		C	√	√			√	√			√	√
4th	Kinetic & Photochemistry Coordination Chemistry (1)	C	√				√				√	
4th	Biochemistry (1) Organic Chemistry (4)	C	√				√				√	
4th	Fundamentals of Industrial Chemistry Petroleum Chemistry	C	√	√			√	√			√	√
4th	Electric Chemistry Coordination Chemistry (2)	O	√	√	√		√	√			√	√
4th	Biochemistry (2) Organic Chemistry (5)	C	√	√			√	√			√	√
4th	Applications of Industrial Chemistry Green Chemistry	C	√	√			√	√			√	√

4th	Spectroscopy Instrumental Analysis Biochemistry (3)	C	√				√				√	
4th	Fundamental of Polymers Quantum Chemistry	C	√				√				√	
4th	Identification of Organic Spectrum (1) Metallic Organic Chemistry	C	√				√					
			√				√				√	
4th	English Language	C	√				√					
	Electrical Instrumental Analysis	C	√				√					
	Biochemistry (4)	C	√			√	√			√	√	
	Petrochemical	C										
	Spectrum Chemistry	C	√			√	√			√	√	
	Identification of Organic Spectrum (2)	C	√			√	√			√	√	
	Industrial Recovery	C				√						
	Research Project	C	√			√	√			√	√	

**MODULE DESCRIPTION FORM**  
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Analytical Chemistry- quantitative analysis		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code			
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	UGx11 1	Semester of Delivery	
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ahmed Subhi Eaheca	e-mail	ahmeaheaheca@uoanbar.edu.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	pH.D
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>The quantitative analysis methods course is determined according to the study plan prepared in the Applied Chemistry Department.</li> <li>The aim of the study is a comprehensive and clear definition of the basics of quantitative analytical chemistry</li> <li>Description of measurable compounds and substances in chemical units of concentration and weight</li> <li>Comprehensive knowledge of bases, acids and their theories</li> </ol>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>That the student know the general concepts of compounds in the analytical chemistry curriculum.</li> <li>The student should be familiar with the basics and rules classification of analytical chemistry weight and concentration units</li> <li>The student should know the basic of Aqueous- solution in chemistry , solution of electrolytes and classification of electrolytes</li> <li>The student should know the of the Acid – base theory and Acid – base conjugated , amphiprotic species</li> <li>The student should know for Chemical equilibrium and types of equilibrium</li> <li>The student should understand for Solubility and solubility products constant, dissociation of a weak acid or base and hydrolysis constant</li> </ol>
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> <li>Methods of teaching and learning               <ol style="list-style-type: none"> <li>Giving lectures.</li> <li>Using the method of recitation, discussion and solving questions.</li> <li>Giving assignments to students to strengthen them and prepare them for the final and final exams.</li> </ol> </li> </ol>

	<p style="text-align: center;"><b>b- Evaluation methods</b>  <b>1- Daily and monthly exams</b>  <b>2- Duties</b>  <b>3- In-class exercises</b></p>
<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

<b>Student Workload (SWL)</b> الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	<b>109</b>	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	<b>7</b>
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	<b>91</b>	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	<b>6</b>
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>200</b>		

<b>Module Evaluation</b> تقييم المادة الدراسية					
	<b>As</b>	<b>Time/Number</b>	<b>Weight (Marks)</b>	<b>Week Due</b>	<b>Relevant Learning Outcome</b>
<b>Formative assessment</b>	<b>Quizzes</b>	<b>2</b>	<b>10% (10)</b>	<b>5 and 10</b>	<b>LO #1, #2 and #10, #11</b>
	<b>Assignments</b>	<b>2</b>	<b>10% (10)</b>	<b>2 and 12</b>	<b>LO #3, #4 and #6, #7</b>
	<b>Projects / Lab.</b>	<b>1</b>	<b>10% (10)</b>	<b>Continuous</b>	<b>All</b>
	<b>Report</b>	<b>1</b>	<b>10% (10)</b>	<b>13</b>	<b>LO #5, #8 and #10</b>
<b>Summative assessment</b>	<b>Midterm Exam</b>	<b>2hr</b>	<b>10% (10)</b>	<b>7</b>	<b>LO #1 - #7</b>
	<b>Final Exam</b>	<b>3hr</b>	<b>50% (50)</b>	<b>16</b>	<b>All</b>
<b>Total assessment</b>			<b>100% (100 Marks)</b>		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
<b>Week</b>	<b>Material Covered</b>
<b>Week 1</b>	<b>General Introduction , classification of analytical chemistry weight and concentration units</b>
<b>Week 2</b>	<b>Method of expressing of concentration</b>
<b>Week 3</b>	<b>Aqueous- solution in chemistry , solution of electrolytes and classification of electrolytes</b>
<b>Week 4</b>	<b>Acid – base theory</b>
<b>Week 5</b>	<b>Acid – base conjugated , amphiprotic species</b>
<b>Week 6</b>	<b>Chemical equilibrium, types of equilibrium</b>
<b>Week 7</b>	<b>Equilibrium constant ( ionic- products constant of water(<math>K_w</math> )</b>
<b>Week 8</b>	<b>Solubility and solubility products constant, dissociation of a weak acid or base , hydrolysis constant (<math>K_h</math> )</b>
<b>Week 9</b>	<b>Formation constant of complex , multistep equilibrium types, definitions, calculations</b>
<b>Week 10</b>	<b>definitions, calculations and solve problems of equilibrium</b>
<b>Week 11</b>	<b>Effect of common ion, effect of complex formation on solubility</b>
<b>Week 12</b>	<b>Solve problems common ion and complex formation</b>
<b>Week 13</b>	<b>Activity and activity coefficient: definitions, examples and calculations</b>
<b>Week 14</b>	<b>Ionic strength : definitions, examples and calculations</b>
<b>Week 15</b>	<b>Overall review of curriculum</b>
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	Lab 1: Introduction quantities analysis (WET reaction)
Week 2	Lab 2: Reaction of group I (Ag+, Pb+2 , Hg-3)
Week 3	Lab 3: separation of unknown solution
Week 4	Lab 4: reaction of group II
Week 5	Lab 5: reaction of group III
Week 6	Lab 6: separation of unknown solution
Week 7	Lab 7: reaction of group IV, group V and separation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<ol style="list-style-type: none"> <li>1. Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch (z-lib.org)</li> <li>2. Quantitative Chemical Analysis (9th Edition) By Daniel C. Harris</li> <li>3. Analytical Chemistry (6th Edition) by Gary D. Christian</li> </ol>	Yes
Recommended Texts	NO	No
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>	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

**MODULE DESCRIPTION FORM**

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Analytical Chemistry- volumetric analysis		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code			
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	UGx11 1	Semester of Delivery	
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ahmed Subhi Eaheea	e-mail	ahmedeaheea@uoanbar.edu.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	pH.D
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	<p><b>5.</b> The volumetric analysis course is determined according to the study plan prepared in the Applied Chemistry Department.</p> <p><b>6.</b> The aim of the study is a comprehensive and clear definition of the basics of Volumetric in analytical chemistry</p> <p><b>7.</b> Description of measurable compounds and substances in chemical units pH</p> <p><b>8.</b> Comprehensive knowledge of bases, acids titrations</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>7- That the student know the general concepts of compounds in the volumetric analysis in analytical chemistry curriculum.</p> <p>8- The student should be familiar with the basics and rules Volumetric methods of analysis and requirements for a primer standard material</p> <p>9- The student should know the basic of Volumetric calculations for acid base titration and equilibriums in acid base solution</p> <p>10- The student should know the of the Calculation of pH of acid and base and pH of salts</p> <p>11- The student should know for Buffer solutions, Calculation of pH of Buffer solutions and buffer capacity</p> <p>12- The student should understand for Precipitation titration and Complexometric titration</p>
Indicative Contents المحتويات الإرشادية	<p>a- Methods of teaching and learning</p> <p>1- Giving lectures.</p> <p>2- Using the method of recitation, discussion and solving questions.</p> <p>3- Giving assignments to students to strengthen them and prepare them for the final and final exams.</p> <p>b- Evaluation methods</p> <p>1- Daily and monthly exams</p> <p>2- Duties</p>

	<b>3- In-class exercises</b>
<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	<b>109</b>	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	<b>7</b>
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	<b>91</b>	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	<b>6</b>
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>200</b>		

<b>Module Evaluation</b> تقييم المادة الدراسية					
	<b>As</b>	<b>Time/Number</b>	<b>Weight (Marks)</b>	<b>Week Due</b>	<b>Relevant Learning Outcome</b>
<b>Formative assessment</b>	<b>Quizzes</b>	<b>2</b>	<b>10% (10)</b>	<b>5 and 10</b>	<b>LO #1, #2 and #10, #11</b>
	<b>Assignments</b>	<b>2</b>	<b>10% (10)</b>	<b>2 and 12</b>	<b>LO #3, #4 and #6, #7</b>
	<b>Projects / Lab.</b>	<b>1</b>	<b>10% (10)</b>	<b>Continuous</b>	<b>All</b>
	<b>Report</b>	<b>1</b>	<b>10% (10)</b>	<b>13</b>	<b>LO #5, #8 and #10</b>
<b>Summative assessment</b>	<b>Midterm Exam</b>	<b>2hr</b>	<b>10% (10)</b>	<b>7</b>	<b>LO #1 - #7</b>
	<b>Final Exam</b>	<b>3hr</b>	<b>50% (50)</b>	<b>16</b>	<b>All</b>
<b>Total assessment</b>			<b>100% (100 Marks)</b>		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
<b>Week</b>	<b>Material Covered</b>
<b>Week 1</b>	<b>Volumetric methods of analysis, requirements for a primer standard material , Volumetric calculations for acid base titration and equilibriums in acid base solution</b>
<b>Week 2</b>	<b>Calculation of pH of acid and base</b>
<b>Week 3</b>	<b>Calculation of pH of salts solutions</b>
<b>Week 4</b>	<b>Salts deferential from strong acid and strong base &amp; weak acid and strong base</b>
<b>Week 5</b>	<b>Salts deferential from strong acid and weak base &amp; weak acid and weak base</b>
<b>Week 6</b>	<b>Buffer solutions</b>
<b>Week 7</b>	<b>Calculation of pH of Buffer solutions and buffer capacity</b>
<b>Week 8</b>	<b>Acid base titration , Acid base indicator</b>
<b>Week 9</b>	<b>Theories of indicators</b>
<b>Week 10</b>	<b>Titration curves of acid base (strong –weak)</b>
<b>Week 11</b>	<b>Differential titration (titration mixture of two acid with one base and two base with one acid)</b>
<b>Week 12</b>	<b>Calculation the concentration of pieces of weak acids in known pH</b> <ul style="list-style-type: none"> <li>• Monoprotic acids</li> <li>• Diprotic acids</li> <li>• Triprotic acids</li> </ul> <b>Titration of polyprotic acid</b>
<b>Week 13</b>	<b>Precipitation titration</b>
<b>Week 14</b>	<b>Complexometric titration</b>
<b>Week 15</b>	<b>Overall review of curriculum</b>
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	Lab 1: Introduction to volumetric analysis
Week 2	Lab 2: preparation approximately (0.1N) HCl and (0.1N) sodium carbonate
Week 3	Lab 3: standardization of HCl with standard solution of sodium carbonate
Week 4	Lab 4: standardization of NaOH with standard solution of HCl
Week 5	Lab 5: analysis of mixture (NaOH +Na <sub>2</sub> CO <sub>3</sub> )
Week 6	Lab 6: determination of chloride ion by Mohr method
Week 7	Lab 7: determination of total hardness of water

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	4. Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch (z-lib.org) 5. Quantitative Chemical Analysis (9th Edition) By Daniel C. Harris 6. Analytical Chemistry (6th Edition) by Gary D. Christian	Yes
Recommended Texts	NO	No
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>	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

**MODULE DESCRIPTION FORM**

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Inorganic Chemistry		Module Delivery
Module Type	Course ( 1 <sup>st</sup> course)		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	7.00		
ECTS Credits	8		
SWL (hr/sem)	175		
Module Level	UGx1 1	Semester of Delivery	
Administering Department	Univ. of Anbar	College	College of science
Module Leader	Dr. Sattar Salim Ibrahim	e-mail	Sattar_salim1976@yahoo.com
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Name	e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of this course is to introduce the student to the basics of fundamental concepts in inorganic Chemistry. At the end of this course the student will be know what mean atomic structure, natural of radiation, electromagnetic radiation, wave natural, energy levels , orbital d,p, determine shielding symbol for atom have more than electron ,some period properties , ionic bond, structure of covalent molecule . molecular orbitals, VB theory, VSEPR theory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ul style="list-style-type: none"> <li>- Give an idea to the student about the atomic structure of the elements and an explanation of quantum theory</li> <li>- Knowledge of the nature of radiation and types of spectra Atomic in addition to the study of the linear spectrum radiation emitted by hydrogen gas.</li> <li>- Use four quantum numbers to describe energy of Electron.</li> <li>- Determining the total energy of the main shell in which the electron rotates, as well as determining the shape of the secondary shells within the main shell, determining the orbital direction towards the magnetic field and the direction of the electron's rotation around itself, in addition to the most stable electronic arrangement in the atom.</li> <li>- Introducing students to the periodic table and its contents Of the elements and its subdivisions in addition to his education</li> </ul> <p align="center">Term codes</p>
Indicative Contents المحتويات الإرشادية	<p align="center">Indicative content includes the following.</p> <ul style="list-style-type: none"> <li>- Deduce the geometric shape of the molecules of any compound from compounds to major components through Introducing the student to the rules of space chemistry for the non-transition element.</li> </ul>

	<ul style="list-style-type: none"> <li>- The possibility of studying electronic structures and the bonding properties of diatomic molecules heterogeneous</li> <li>- Evaluation of the student and the extent to which he benefited from it Lectures and scientific potential</li> </ul>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)		
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	14	LO #1 - #14
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Atomic electron structure
Week 2	Origin of quantum theory
Week 3	Electromagnetic radiation – Radiation of black body
Week 4	Photo electric effect
Week 5	Atomic spectra – Line spectrum of H – Bohr theory
Week 6	Summerfield theory – Zeman effect – Electron spin effect
Week 7	The basic principle of wave mechanic
Week 8	First exam
Week 9	Heisenberg's uncertainly principle
Week 10	Schrodinger equation
Week 11	Quantum numbers
Week 12	The term symbols
Week 13	Periodic tables of elements
Week 14	Anomalies in the electronic arrangement and properties of periodic tables
Week 15	Second exam

Week 16	Preparatory week before the final Exam
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Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- Inorganic chemistry by Dr. Thana Al- Hasani 2- Inorganic chemistry, principles of structure and reactivity, 2nd ed., James E. Huheey, 1983 3- Inorganic chemistry, 3rd ed., Housecroft C.E. and Sharpe A.G., 2008.	Yes
Recommended Texts	No	No
Websites	<a href="http://rapidshare.de/files/20322418/Patnaik_P_Handbook_of_inorganic_chemicals_McGraw_Hill_2003">http://rapidshare.de/files/20322418/Patnaik_P_Handbook_of_inorganic_chemicals_McGraw_Hill_2003</a>	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

**MODULE DESCRIPTION FORM**

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Inorganic Chemistry		Module Delivery
Module Type	Course ( 2 <sup>nd</sup> course)		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	7.00		
ECTS Credits	8		
SWL (hr/sem)	175		
Module Level	UGx11 1	Semester of Delivery	
Administering Department	Univ. of Anbar	College	College of science
Module Leader	Dr. Sattar Salim Ibrahim		e-mail
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail
Peer Reviewer Name	Name		e-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of this course is to introduce the student to the basics of fundamental concepts in inorganic Chemistry. At the end of this course the student will be know what mean atomic structure, natural of radiation, electromagnetic radiation, wave natural, energy levels , orbital d,p, determine shielding symbol for atom have more than electron ,some period properties , ionic bond, structure of covalent molecule . molecular orbitals, VB theory, VSEPR theory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ul style="list-style-type: none"> <li>- Introducing the student to molecular hybridization and giving him an idea of geometric shapes</li> <li>- Deduce the geometric shape of the molecules of any compound</li> <li>From compounds to major components through Introducing the student to the rules of space chemistry for the non-transition element</li> <li>- Give a simplified idea of some properties the physical elements that can be taken as a basis for arriving at the chemical behavior of these elements depending on their positions in the table.</li> <li>- Introducing students to the hydrogen atom and its compounds and their interactions Hydrogen - isotopes of hydrogen - its compounds And prepare it.</li> <li>- Evaluation of the student and the extent to which he benefited from it Lectures and scientific potential.</li> </ul>
Indicative Contents المحتويات الإرشادية	<p align="center">Indicative content includes the following.</p> <ul style="list-style-type: none"> <li>- Deduce the geometric shape of the molecules of any compound from compounds to major components through Introducing the student to the rules of space chemistry for the non-transition element.</li> <li>- The possibility of studying electronic structures and the bonding</li> </ul>

	<p>properties of diatomic molecules heterogeneous</p> <p>- Evaluation of the student and the extent to which he benefited from it</p> <p>Lectures and scientific potential</p>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials .

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		200	

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
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	Projects / Lab.	1	10% (10)		
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	14	LO #1 - #14
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Ionic compounds ( properties and conditions of formation of ionic compounds)
Week 2	Crystal lattice energy – Born lande equation
Week 3	Born – Haber cycle – polarization of ionic compound – dissolving of ionic compound – structure of ionic compounds
Week 4	Baraveas lattice – packing of bools – Coordination number
Week 5	Types of crystals – properties of NaCl, CsCl and TiO <sub>2</sub> crystals.
Week 6	First exam
Week 7	Covalent bond and its properties
Week 8	The theory of covalent bond formation ( VBT and MOT)
Week 9	Idea of interaction and force of bond – The symmetry in atomic orbitals
Week 10	Hybridization
Week 11	Hydrogen ( properties, isotopes, formation, its compounds , preparation, the bond of hydrogen and the hydrides and its verities
Week 12	The first and second groups
Week 13	The third groups
Week 14	The fourth groups

Week 15	Second exam
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	2- Inorganic chemistry by Dr. Thana Al- Hasani 2- Inorganic chemistry, principles of structure and reactivity, 2nd ed., James E. Huheey, 1983 3- Inorganic chemistry, 3rd ed., Housecroft C.E. and Sharpe A.G., 2008.	Yes
Recommended Texts	No	No
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