University of Anbar

جامعة الانبار

First Cycle – Bachelor's degree (B.Sc.) – Chemistry

1. Mission & Vision Statement

Vision Statement

The academic staff of chemistry department – Collage of Science at University of Anbar believe that students registered at this department in order to understand the multidiscipline of chemistry through a variety of patterns of course work, laboratory experiences, research, and teamwork. This combination of instructional methods leads students to equalized understanding of the scientific techniques used by chemists . Small class sizes within the chemistry program foster a close working relationship between academic staff and students in an nurturing atmosphere. it is one of the top departments at the level of universities. The vision of the department is to generate knowledge and skills by applying new technologies to teaching. We are encouraging our students to contribute to society through teaching, training, and conducting active research. The department of Chemistry distinguishes itself by its strong cross-disciplinary collaborations both within and outside the university and country.

Mission Statement

The academic staff of chemistry department – Collage of Science pursues a multifaceted charge at University of Anbar The department works hard to inspire and educate young minds, discover their talents, and conduct and maintain research and teaching at a high level. We are working to take the lead in finding solutions to problems of global significance through participation in international and national research networks. The department is offering research projects with a high emphasis on theory and practical training that is needed for the transformation of the budding chemist into a productive member

of society, an independent researcher, and a productive scientist. Our goal is to use high standards for excellence in all branches of chemistry that will produce students in chemistry who can think critically.

2. Program Specification

Programme code:	BSc-CHE	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

Chemistry is astonishingly wide-ranging subject and is well fortified to deliver. The emphasis of this programmer is the Atom and Molecular and synthesis of these compounds and Identification to which everything is correlated, be it the molecules form Organic or Inoraganic in our system. It is a common degree - –or some it's' the breadth of the subject that appeals, for others it's a path to specialization. All students have the opportunity to transfer onto our specialist degrees in Analytical Chemistry , Inoraganic Chemistry at the end of the first year.

In Level 1 students are exposes to core topics such as Analytical chemistry , Inorganic chemistry and Laboratory Safety as well as other topics, appropriate for progression to all programmers within the chemistry programme group. The majority of programme-specific core topics are covered at Level 2 preparing for research-led topic specialist modules at Levels 3 and 4. The University Chemistry graduate is therefore instructed to gain how research informs teaching, according to the University and School Mission statements.

At Levels 4 students have the opportunity to choose one or two topics from their module credits with the proviso a range of modules are selected that reflect of life forms from Atom, through compounds , both oraganic and inorganic , to populations to ensure the breadth of knowledge expected of a graduate with a chemistry degree. This allows students to develop their own wide-ranging interests in Chemistry. Decisions on what to study are made with input from personal tutors.

The research ethos is developed and fostered from the start via practicals, which are either embedded in lecture modules or taught in enthusiastic practical modules, research seminars and tutorials. There is a compulsory field course in Level 1, which students have to pass in order to progress into Level 2, and optional field courses in Levels 4. At Level 4 all students carry out an independent research project, which has a 4-credit library or data analysis project, or laboratory-based project or a combination of all of the above mentioned.

Academic tutorials are held at Levels 1 and 2 with the same tutor, who is also the individual tutor, providing continuity and progressive guidance. Level 1 and 2 tutorials include a number of workshops to demonstrate skills such as library usage and presentation skills, followed by evaluated exercises (essays and talks) as opportunities to exercise these skills in a subject-specific context.

International years and Industrial placements are also offered and individual needs are discussed with the appropriate tutor and accommodated wherever possible.

3. Program Objectives

1. Providing the community with graduates in various branches of chemistry sciences who are able to deal with the requirements of scientific research and can work in health laboratories, construction laboratories, control and standardization, food and pharmaceutical industries, various chemical industries, including oil and petrochemical industries.
2. with qualified teachers to teach in various schools and universities in Iraq offering high-quality educational services in various chemistry specialties that meet the needs of society and the labor market through strong and clear commitment.
3. Teach chemistry to students in other departments within the College of Sciences and other colleges in the university.
4. Perform scientific research while staying current with worldwide research and development in the field.
5. Provide chemical analysis services and scientific consulting for both state institutions and the private sector. abroad

4. Student Learning Outcomes

Chemistry Students will gain an understanding of: chemical reactions and strategies to balance them. the relative quantities of reactants and products. the fundamental properties of atoms, molecules, and the various states of matter, The Department offers a Bachelor of Science in Chemistry with a concentration in Biochemistry; Pre-medicine / Pre-dentistry; Analytical Chemistry / biochemistry and a minor in Secondary Education that leads to a Public Instruction License. Additionally, the Department offers courses to a large number of students from other departments and supports pre-professional programs. The Chemistry curriculum and experiences are designed to prepare students, in part, for entry into professional health programs, graduate studies, technical careers and education.

Outcome 1

perform and design scientific experiments in all fields of chemistry, be able to evaluate the scientific aspects, principles, and future directions of their study.

Outcome 2

be able to manage safety and health protocols and will be directed to work as a part of a team. -be able to explore new areas of research that help the society by addressing solutions to economic, environmental, health, and social problems.

Outcome 3

gain skills that help them employ critical thinking in the major chemistry branches such as organic, inorganic, analytical, and physical chemistry.

Outcome 4

have the ability to use literature in writing reports, submitting presentations, and publishing manuscripts, and they will gain enough knowledge to pursue postgraduate studies in a variety of disciplines such as pharmacy, medicine, dentistry, etc..

Outcome 5

Data Analyses

Graduates will be able to demonstrate scientific quantitative skills, such as the ability to conduct simple data analyses.

Outcome 6

Critical Thinking

Graduates will be able to use critical-thinking and problem-solving skills to develop a research project and/or paper.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

University of Anbar is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME يخطط انذرجبث				
Group	**Grade**	انتقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	إمتياز	90 - 100	Outstanding Performance
	B - Very Good	جيذ جذا	80 - 89	Above average with some errors
	C - Good	جيذ	70 - 79	Sound work with notable errors
	D - Satisfactory	يتسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	يقبل	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب - قيذ انعًبنجت	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number 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.				

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 4-year B.Sc. degree: CGPA = [(1st ᵐodule score x ECTS) + (2nd ᵐodule score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-111	Analytical(1)	94	81	7.00	C	
Che-112	Inorganic (1)	94	81	7.00	C	
CoS-113	geology	48	77	4.00	B	
Che-114	Laboratory Sefty	48	52	4.00	B	
UoA-115	Human Rights and freedoms	48	27	4.00	S	
UoA-116	Arabic Language (1)	63	37	4.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-121	Analytical 2	79	96	7.00	C	Che-111
Che-122	Inorganic 2	79	96	7.00	C	Che-112
CoS-123	Mathematics I	48	27	3.00	B	
CoS-124	Physics	64	61	5.00	B	
UoA-125	Computers program	64	36	4.00	B	
UoA-126	English Language	63	37	4.00	S	
UOA104	Crimes of Baath	17	7	1.00	S	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-211	Analytical 3	79	71	6.00	C	Che-121
Che-212	Inorganic 3	79	71	6.00	C	Che-122
Che-213	Physical Chemistry 1	64	61	5.00	C	
Che-214	Organic Chemistry 1	64	61	5.00	C	
Sci-215	Cytology	64	61	5.00	B	
Sci-216	Mathematics II	48	27	3.00	B	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-221	Analytical 4	79	71	6.00	C	Che-211
Che-222	Inorganic 4	79	71	6.00	C	Che-212
Che-223	Physical Chemistry 2	64	61	5.00	C	Che-213
Che-224	Organic Chemistry 2	64	61	5.00	C	Che-214
Che-225	Nanotechnology	64	61	5.00	B	
Che-226	Statistical	48	27	3.00	B	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-312	Inorganic chemistry 5	79	71	6.00	C	Che-222
Che-313	Physical chemistry 3	79	71	6.00	C	Che-223
Che-314	Organic chemistry 3	79	71	6.00	C	Che-224
Che-315	Biochemistry 1	79	71	6.00	C	Che-215
Che-316	Industrial chemistry 1	48	52	4.00	C	Che-226
Che-317	Selective 1	33	17	2.00	B	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-312	Inorganic chemistry 5	79	71	6.00	C	Che-222
Che-313	Physical chemistry 3	79	71	6.00	C	Che-223
Che-314	Organic chemistry 3	79	71	6.00	C	Che-224
Che-315	Biochemistry 2	79	71	6.00	C	Che-215
Che-316	Industrial chemistry 1	48	52	4.00	C	Che-226
Che-317	Research methodology	33	17	2.00	B	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-411	Instrumental analysis 1	79	71	6.00	C	Che-221
Che-414	Identification 1	79	46	5.00	C	Che-324
Che-417	Biochemistry 3	79	46	5.00	C	Che-325
Che-420	Industrial chemistry3	78	72	6.00	C	Che-326
Che-423	Spectroscopy chemistry	48	52	4.00	C	
Che-426	Research project	33	67	4.00	B	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module Name	SSWL	USSWL	ECTS	Module Type	Pre-request
Che-421	Instrumental analysis 2	79	71	6.00	C	Che-411
Che-424	Identification 2	79	46	5.00	C	Che-414
Che-427	Biochemistry 4	79	46	5.00	C	Che-415
Che-430	Industrial chemistry 4	78	72	6.00	C	Che-416
Che-433	Quantum chemistry	48	52	4.00	C	Che-413
Che-436	selective 2	33	67	4.00	S	

8. Contact

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Program Coordinator:

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Analytical Chemistry- quantitative analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**UGx11 1**		**Semester of Delivery**	**1**	
Administering Department	**Type Dept. Code**	**College**	**Type College Code**		
Module Leader	**Ahmed Subhi Eaheea**	**e-mail**	**ahmeaheaheea@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	**01/06/2025**	**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	**1. The quantitative analysis methods course is determined according to the study plan prepared in the Applied Chemistry Department.** **2. The aim of the study is a comprehensive and clear definition of the basics of quantitative analytical chemistry** **3. Description of measurable compounds and substances in chemical units of concentration and weight** **4. Comprehensive knowledge of bases, acids and their theories**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1- That the student know the general concepts of compounds in the analytical chemistry curriculum.** **2- The student should be familiar with the basics and rules classification of analytical chemistry weight and concentration units** **3- The student should know the basic of Aqueous- solution in chemistry , solution of electrolytes and classification of electrolytes** **4- The student should know the of the Acid – base theory and Acid – base conjugated , amphiprotic species** **5- The student should know for Chemical equilibrium and types of equilibrium** **6- The student should understand for Solubility and solubility products constant, dissociation of a weak acid or base and hydrolysis constant**
Indicative Contents المحتويات الإرشادية	**a- Methods of teaching and learning** **1- Giving lectures.** **2- Using the method of recitation, discussion and solving questions.** **3- Giving assignments to students to strengthen them and prepare them for the final and final exams.** **b- Evaluation methods** **1- Daily and monthly exams**

	2- Duties **3- In-class exercises**
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**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.**

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	**7**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**91**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**6**
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)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

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

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	**1. Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch (z-lib.org)** **2. Quantitative Chemical Analysis (9th Edition) By Daniel C. Harris** **3. Analytical Chemistry (6th Edition) by Gary D. Christian**	**Yes**
Recommended Texts	**NO**	**No**
Websites	**https://www.acs.org/careers/chemical-sciences/areas/analytical-chemistry.html**	

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**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**UGx11 1**		**Semester of Delivery**	**1**	
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	**5. The volumetric analysis course is determined according to the study plan prepared in the Applied Chemistry Department.** **6. The aim of the study is a comprehensive and clear definition of the basics of Volumetric in analytical chemistry** **7. Description of measurable compounds and substances in chemical units pH** **8. Comprehensive knowledge of bases, acids titrations**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**7- That the student know the general concepts of compounds in the volumetric analysis in analytical chemistry curriculum.** **8- The student should be familiar with the basics and rules Volumetric methods of analysis and requirements for a primer standard material** **9- The student should know the basic of Volumetric calculations for acid base titration and equilibriums in acid base solution** **10- The student should know the of the Calculation of pH of acid and base and pH of salts** **11- The student should know for Buffer solutions, Calculation of pH of Buffer solutions and buffer capacity** **12- The student should understand for Precipitation titration and Complexometric titration**
Indicative Contents المحتويات الإرشادية	**a- Methods of teaching and learning** **1- Giving lectures.** **2- Using the method of recitation, discussion and solving questions.** **3- Giving assignments to students to strengthen them and prepare them for the final and final exams.** **b- Evaluation methods** **1- Daily and monthly exams** **2- Duties**

	3- In-class exercises
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**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.**

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	**7**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**91**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**6**
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)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Volumetric methods of analysis, requirements for a primer standard material , Volumetric calculations for acid base titration and equilibriums in acid base solution
Week 2	Calculation of pH of acid and base
Week 3	Calculation of pH of salts solutions
Week 4	Salts deferential from strong acid and strong base & weak acid and strong base
Week 5	Salts deferential from strong acid and weak base & weak acid and weak base
Week 6	Buffer solutions
Week 7	Calculation of pH of Buffer solutions and buffer capacity
Week 8	Acid base titration , Acid base indicator
Week 9	Theories of indicators
Week 10	Titration curves of acid base (strong –weak)
Week 11	Differential titration (titration mixture of two acid with one base and two base with one acid)
Week 12	Calculation the concentration of pieces of weak acids in known pH • Monoprotic acids • Diprotic acids • Triprotic acids Titration of polyprotic acid
Week 13	Precipitation titration
Week 14	Complexometric titration
Week 15	Overall review of curriculum
Week 16	Preparatory week before the final Exam

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 ($NaOH + Na_2CO_3$)**
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	**https://www.acs.org/careers/chemical-sciences/areas/analytical-chemistry.html**	

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 (1st course)**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**7.00**				
ECTS Credits	**8**				
SWL (hr/sem)	**175**				
Module Level	**UGx1 1**		**Semester of Delivery**	**1**	
Administering Department	**Univ. of Anbar**		**College**	**Colleege 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	**- Give an idea to the student about the atomic structure of the elements and an explanation of quantum theory** **- 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.** **- Use four quantum numbers to describe energy of Electron.** **- 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.** **- Introducing students to the periodic table and its contents Of the elements and its subdivisions in addition to his education Term codes**
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** **- 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.**

	- **The possibility of studying electronic structures and the bonding properties of diatomic molecules heterogeneous** - **Evaluation of the student and the extent to which he benefited from it** **Lectures and scientific potential**

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 exame**
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

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	**http://rapidshare.de/files/20322418/Patnaik_P._Handbook_of_inorganic_chemicals McGraw_Hill_2003**	

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 (2nd course)**			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**7.00**				
ECTS Credits	**8**				
SWL (hr/sem)	**175**				
Module Level	**UGx11 1**		**Semester of Delivery**		**1**
Administering Department	**Univ. of Anbar**		**College**	**Colleege 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	**- Introducing the student to molecular hybridization and giving him an idea of geometric shapes** **- 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** **- 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.** **- Introducing students to the hydrogen atom and its compounds** **and their interactions Hydrogen - isotopes of hydrogen - its compounds And prepare it.** **- Evaluation of the student and the extent to which he benefited from it Lectures and scientific potential.**
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** **- 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.** **- The possibility of studying electronic structures and the bonding**

	properties of diatomic molecules heterogeneous **- Evaluation of the student and the extent to which he benefited from it** **Lectures and scientific potential**

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	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_2 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**
Websites	**http://rapidshare.de/files/20322418/Patnaik_P. Handbook_of_inorganic_chemicals McGraw_Hill_2003**	

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				**Module Delivery**	
Module Type				☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits					
SWL (hr/sem)					
Module Level		2	**Semester of Delivery**		
Administering Department		Chemistry	**College**	College of Science	
Module Leader	Dr.Rabah Nori Farhan		**e-mail**	rabahalobaidy@uoanbar.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Computer Science
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents الإرشادية والمحتويات التعلم ونتائج الدراسية المادة أهداف	
Module Objectives الدراسية المادة أهداف	• Understand AI Fundamentals: Introduce students to the basic concepts and history of artificial intelligence. • Explore AI Techniques: Provide a comprehensive overview of various AI techniques, including machine learning, deep learning, and fuzzy systems. • Hands-On Experience: Equip students with practical skills in MATLAB for implementing AI algorithms and techniques. • Analyze Applications: Examine real-world applications of AI in various fields and understand their societal implications. • Encourage Critical Thinking: Foster critical thinking regarding ethical considerations and the future of AI technologies.
Module Learning Outcomes الدراسية للمادة التعلم مخرجات	• Define AI Concepts: Explain fundamental concepts and terminology related to artificial intelligence. • Implement AI Algorithms: Develop and implement basic AI algorithms using MATLAB, including supervised and unsupervised learning methods. • Utilize Neural Networks: Design and train various types of neural networks for different applications. • Evaluate AI Applications: Analyze and evaluate the effectiveness of AI applications in daily life and industry. • Discuss Ethical Issues: Articulate the ethical implications and future trends of AI technologies.
Indicative Contents المحتويات الإرشادية	• Impact on Employment: Examination of job displacement and creation due to AI automation. • Ethical Considerations: Discussion on bias, accountability, and transparency in AI systems. • AI in Governance: Exploration of how AI influences public policy, surveillance, and decision-making processes.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Lectures and Discussions:** ○ Use interactive lectures to introduce key concepts, followed by class discussions to encourage critical thinking and engagement. 2. **Hands-On Labs:** ○ Implement practical lab sessions in MATLAB where students can apply theoretical knowledge to real-world problems through coding exercises and projects. 3. **Group Projects:** ○ Facilitate collaborative learning by assigning group projects that require teamwork to explore specific AI applications or techniques. 4. **Online Resources:** ○ Utilize online platforms and resources for additional learning materials, tutorials, and forums for discussion and support outside of class.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) **الفصل خلال للطالب المنتظم الدراسي الحمل**		**Structured SWL (h/w)** **أسبوعيا للطالب المنتظم الدراسي الحمل**	5
Unstructured SWL (h/sem) **الفصل خلال للطالب المنتظم غير الدراسي الحمل**		**Unstructured SWL (h/w)** **أسبوعيا للطالب المنتظم غير الدراسي الحمل**	6
Total SWL (h/sem) **الفصل خلال للطالب الكلي الدراسي الحمل**			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				

	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	**Introduction and History of AI. Definition of Artificial Intelligence .Brief history of AI: Turing Test, early developments (1950s-1970s). Key milestones in AI history.**
Week 2	**AI Techniques and Approaches: Overview of AI techniques: Machine Learning, Deep Learning, Natural Language Processing Traditional vs. modern approaches to AI.**
Week 3	**Machine Learning Fundamentals. Supervised, unsupervised, and reinforcement learning. Basic algorithms: Genetic Algorithms, Linear regression, decision trees, clustering.**
Week 4	**Deep Learning and Neural Networks. Introduction to neural networks Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs).**
Week 5	**AI in Our Daily Life : Everyday applications of AI: Virtual assistants, recommendation systems, smart home devices .AI in transportation: Autonomous vehicles.**
Week 6	**The Future of AI .Emerging trends in AI: Explainable AI, AI in climate change, human-AI collaboration.**
Week 7	**Applications of AI: Genetic Algorithms.**
Week 8	**Applications of AI: Neural Networks.**
Week 9	**Applications of AI: Feed forward Neural networks.**
Week 10	**Applications of AI: Deep Learning**
Week 11	**Applications of AI: Convolutional Neural Networks (CNN).**
Week 12	**Applications of AI: CNN Case Study.**
Week 13	**Applications of AI: Fuzzy Systems.**
Week 14	**AI future Directions.**
Week 15	
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Matlab for AI applications.
Week 2	Input/output and arrays in Matlab with introduction to functions and files.
Week 3	Genetic Algorithm implementation in Matlab: basics.
Week 4	Genetic Algorithm implementation in Matlab: developing case study and plotting results.
Week 5	Decition Tree: Implement a basic decision tree classifier on a sample dataset.
Week 6	Implement linear regression and clustering algorithms (e.g., k-means) on a dataset
Week 7	Neural Network :MATLAB task: Create a feedforward neural network for a classification problem using the Neural Network Toolbox
Week 8	Deep Neural Networks: Implement a basic deep learning model using the Deep Learning Toolbox
Week 9	Convolutional Neural Networks (CNNs): MATLAB task: Build a CNN.
Week 10	CNN Case Study.
Week 11	Implement a fuzzy inference system
12	Project Development: Students present their final projects that incorporate various AI techniques and tools
13	
14	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks %**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**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	**Organic Chemistry**			**Module Delivery**	
Module Type				☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits					
SWL (hr/sem)	30				
Module Level	2		**Semester of Delivery**	2nd	
Administering Department			**College**	College of Science	
Module Leader	Mohammed Adnan Abid		**e-mail**	moh.adnan@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	1- Omer Saeed Khalifa 2-Marwa Noori Mahmood		**e-mail**	omar.saeed@uoanbar.edu.iq marwa.noori@uoanbar.edu	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	2024		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The course aims to introduce students to the principles of organic chemistry. Also,to learn (reagents, conditions) associated with the carbon and hydrogen with most common elements reactions of use to organic chemists, and to understand (concepts) allowing the design of new (more effective) or even unknown reaction mechanism and reaction processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Understanding of Organic Structure and Bonding** • Understand the nature of covalent bonding in organic molecules. • Recognize and interpret the structure of organic compounds (e.g., alkanes, alkenes, alkynes, aromatic compounds, etc.). • Understand concepts like hybridization, resonance, and molecular orbitals. **2. Mechanisms of Organic Reactions** • Learn and apply the fundamental concepts of organic reaction mechanisms. • Understand and explain reaction pathways (e.g., nucleophilic substitution, electrophilic addition, etc.). • Identify and predict the products of common organic reactions. **3. Functional Groups and Their Chemistry** • Recognize the different functional groups in organic molecules (e.g., alcohols, aldehydes, ketones, carboxylic acids, amines, etc.). • Understand how the functional group affects the chemical and physical properties of molecules. • Identify reactions specific to each functional group.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures 2. Tutorials 3. Homework 4. Tests and Exams 5. In Class questions and discussion 6. Connection between theory and practical

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5 Times	10		
	Assignments	3 Times	10		
	Projects / Lab.	5 Times	10		
	Report	5 Times	10		
Summative assessment	**Midterm Exam**	1 Time	10		
	Final Exam	1 Time	50		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Introduction to Organic Chemistry and Structure
Week 2	Alcohols the reaction mechanisms
Week 3	Ethers, and Epoxides the reaction mechanisms
Week 4	Aldehydes and Ketones
Week 5	Carboxylic Acids and Derivatives
Week 6	Aromatic Compounds (introduction)
Week 7	Aromatic Compounds (principals)
Week 8	Aromatic Compounds (reaction and mechanism)
Week 9	Benzene and its reaction
Week 10	Assessments and Exam
Week 11	Halide Alkyl 1
Week 12	Halide Alkyl 2
Week 13	Revision
Week 14	Preparation for final Exam
Week 15	**Final Exam**
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	التعريف بأدوات وتجارب المختبر وتهيئة المواد الخاصة
Week 2	تحضير بارا نايترو استينالايد
Week 3	تنقية وإعادة بلورة بارا نايترو استينالايد وتعيين درجة الانصهار
Week 4	تحضير بارا نايترو انيلين + اختبار يومي
Week 5	تحضير كاشف لوكاس
Week 6	اختبار عملي بكاشف لوكاس
Week 7	اختبار يومي + تفاعل شوتن- بومن تحضير البنزانالايد
Week 8	اختبار شامل بالتجارب السابقة عملي + نظري
Week 9	استخلاص الكافيين من الشاي
Week 10	تحضير الفثاليماید + اختبار يومي
Week 11	تحضير حامض البنزويك
12	اعادة بلورة حامض البنزويك وتعيين درجة الانصهار
13	اختبار شامل بالتجارب السابقة عملي + نظري
14	اختبار شامل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Organic Chemistry by Jonathan Clayden	Yes and online as well
Recommended Texts	Morrison & Clayden	Yes and online as well
Websites	All websites having organic chemistry topics	

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**			**Module Delivery**	
Module Type	**Course (1st course)**			☒ **Theory**	
Module Code	**Che-221**			☒ **Lecture**	
ECTS Credits	**8**			☒ **Lab**	
SWL (hr/sem)	**200**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	**2**	**Semester of Delivery**	1		
Administering Department	**Univ. of Anbar**	**College**	**Colleege of science**		
Module Leader	**Dr. Wahran MonamSaod**	**e-mail**	**Sc.wahran.s@uoanbar.edu.iq**		
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	20/01/2025	**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	Course Objectives To introduce basic analytical techniques and practical aspects of classical chemical analysis. To solve problems related to precipitation and interpret analytical results. Identifying the precipitation and its methods, learning about type of precipitating factor, method of precipitation . •
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	explain the fundamentals of analytical chemistry and steps of a characteristic analysis. • Expresses the role of analytical chemistry in science.compare qualitative and quantitative analyses. • Expresses the quantitative analysis methods.expresses the qualitative analysis methods. • Evaluate the analytical data in terms of statistics. • Estimates kinds of errors in chemical analysis. • Evaluates the effects of systematic errors on analytical results.compare of the experimental mean with true value and two experimental means. • Determine the detection limits.interpret the statistical tests.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** - Understand the fundamental principles and thermodynamics of precipitation equilibria.

	- Explain the mechanisms of precipitation, coprecipitation, and the factors affecting precipitate purity and particle size. - Select appropriate precipitation reagents and conditions for specific separation goals (analysis, pre-concentration, interference removal). - Apply strategies to enhance selectivity and minimize errors (coprecipitation, solubility losses). - Describe and perform (theoretically and practically) the key steps in gravimetric analysis based on precipitation. - - Evaluate the advantages, limitations, and applications of precipitation separation methods in modern analytical chemistry Evaluation of the student and the extent to which he benefited from it Lectures and scientific potential

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1-the ability to communicate information after monitoring and data collection . 2-linking information with human health reality and influencing other neighborhoods. 3-field visits in non-organic industrial projects 4-participation in workshops, seminars and scientific conferences

	5-follow-up scientific development through contact with international universities

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**75**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**125**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation تقييم المادة الدراسية					
		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	
	Material Covered
Week 1	Overview of the principles of the chemical precipitation
Week 2	Classical deposition methods
Week 3	Precipitation separation methods
Week 4	Chemical precipitation
Week 5	Factors affecting chemical precipitation
Week 6	Chemical sediment pollutants
Week 7	Precipitation from homogeneous solutions
Week 8	First month exam
Week 9	Electrode position
Week 10	Electrostatic deposition devices
Week 11	Deposition under controlled voltage
Week 12	The use of platinum electrodes in the deposition process
Week 13	High performance liquid chromatography
Week 14	Chemical and electrical deposition applications
Week 15	Second month exam
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Experiment about extraction of oil
Week 2	Experiment about continuous extraction of I2
Week 3	Experiment about simple extraction
Week 4	Experiment about continuous extraction
Week 5	Extraction of tea from aqueous solution
Week 6	Review
Week 7	Quizzed

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Required textbooks (curricular books, if any) Chemical precipitation methods/Ismail Khalil Al-Hiti 2- Main references (sources) Introduction to chemical deposition methods/ Safaa Razouki Al-Marhib 3- Recommended books and references (scientific journals, reports...) Fundamentals of Analytical Chemistry 4- by Douglas A. Skoog, Donald M. West, et al. 5-	Yes
Recommended Texts	No	No
Websites	1- Electronic References, Websites Researchgate	

	2- Google scholar 3- https://www.springer.com/journal/13762/

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