

Course Description Form to the academic year 2023-2024

1. Course Name:

Organic chemistry-I

2. Course Code:

3. Semester / Year:

2nd semester / First Year

4. Description Preparation Date:

24/2/2024

5. Available Attendance Forms:

In-person/integrated electronic and remote in cases of holidays and make-lessons

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

75 hours (45 theoretical + 30 practical) / 4 Units

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

Name: Bassam A Hussein

Email: Bassamalsafee@utq.edu.iq

8. Course Objectives

- Course Objectives
- Providing students with a theoretical background in the principles of organic chemistry,
 - The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.

9. Teaching and Learning Strategies

- Strategy
- Using smart screens
 - Laboratory part
 - Use YouTube clips.
 - Discussion circles prepared by students under the supervision of teachers for the purpose of enhancing the scientific material with everything that is new related to the studied or related topics.
 - Read methodological and helpful books to enhance self-learning ability.
 - Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports.

10. Course Structure

Week	Hours	Required Learning	Unit or subject	Learning	Evaluation
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		Outcomes	name	method	method
1	3	Introduction	Introduction Hybridization	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
2	3	Alkanes and methane	Alkanes ,reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
3	3	Alkanes and methane	methane, reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	3	Alkenes I and II	Alkenes I, reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	3	Alkenes I and II	Alkenes II, reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
6	3	Alkynes and dienes.	Alkynes , reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
Mid-term exam					
7	3	Alkynes and dienes.	dienes, reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

8-9	4	Stereochemistry I & II	Stereochemistry I	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
9	2	Stereochemistry I & II	Stereochemistry II	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
10	3	Alcohols and ethers	. Alcohols, reaction, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
11	3	Alcohols and ethers	ethers, reaction, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
12&13	3	Alkyl halides	Alkyl halides ethers, reaction, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
14	3	Cycloalkanes	, reaction, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 4 marks, home work report 3 marks, practical part 20 marks, mid-term exam: 13 marks, final term exam: 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any) Morsrison and Boyd-Organic Chemistry

Main references (sources)

Jerry March- Organic Chemistry

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

organic chemistry janice

Electronic References, Websites

Course Description Form to the academic year 2023-2024

1. Course Name:

Organic chemistry-II

2. Course Code:

3. Semester / Year:

1st semester / Second Year

4. Description Preparation Date:

24/2/2024

5. Available Attendance Forms:

In-person/integrated electronic and remote in cases of holidays and make-up lessons

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

75 hours (45 theoretical + 30 practical) / 4 Units

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

Name: Bassam A Hussein

Email: Bassamalsafee@utq.edu.iq

8. Course Objectives

- Course Objectives**
- Providing students with a theoretical background in the principles of aromatic chemistry, Carboxylic acids, Amines I and II. Aldehydes and ketones, Phenols.
 - The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.

9. Teaching and Learning Strategies

- Strategy**
- Using smart screens
 - Laboratory part
 - Use YouTube clips.
 - Discussion circles prepared by students under the supervision of teachers for the purpose of enhancing the scientific material with everything that is new related to the studied or related topics.
 - Read methodological and helpful books to enhance self-learning ability.
 - Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Aromatic Hydrocarb	Benzene ,aromaticity classification	Theoretical lectures using various scientific methods and	Oral, written and surprise examinations and various other means of testing

				means of explanation, electronic, in-person and combined	
2	3	Aromatic Hydrocarbons	nomenclature	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
3	3	Aromatic Hydrocarbons	electrophilic aromatic 10 substitution, arenas and their derivatives	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	3	Carboxylic acids:	Carboxylic acids: properties reactions, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	3	Carboxylic acids:	Functional derivatives of carboxylic acids, reaction, preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
6	3	Amines I and II	Amines nomenclature	Theoretical lectures using various scientific methods and means of	Oral, written and surprise examinations and various other means of testing

				explanation, electronic, in- person and combined	
7	3	Amines I and II	reaction ,preparation, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in- person and combined	Oral, written and surprise examinations and various other means of testing
8	4	Mid term exam			written
9	2	ldehydes and ketones	Nomenclatures	Theoretical lectures using various scientific methods and means of explanation, electronic, in- person and combined	Oral, written and surprise examinations and various other means of testing
10	3	ldehydes and ketones	,preparation, reaction ,nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in- person and combined	Oral, written and surprise examinations and various other means of testing
11	3	ldehydes and ketones	aldol and Claisen condensation);	Theoretical lectures using various scientific methods and means of explanation, electronic, in- person and combined	Oral, written and surprise examinations and various other means of testing
12	3	ldehydes and ketones	Classificati on	Theoretical lectures using various scientific	Oral, written and surprise examinations and various other

				methods and means of explanation, electronic, in-person and combined	means of testing
13	3	Phenols	, nomenclature, physical properties	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
14		Phenols	reaction, preparation,	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 4 marks, home work report 3 marks, practical part 20 marks, mid-term exam: 13 marks, final term exam: 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any) Morsrison and Boyd-Organic Chemistry


Main references (sources)

Jerry March- Organic Chemistry

Recommended books and references (scientific journals, reports...) organic chemistry janice

Electronic References, Websites -----

Course Description Form

1. Course Name:					
Analytical Chemistry					
2. Course Code:					
3. Semester / Year:					
1 st semester/ 1 st year					
4. Description Preparation Date:					
24/2/2024					
5. Available Attendance Forms:					
scientific lectures and practical experiments					
6. Number of Credit Hours (Total) / Number of Units (Total)					
75 hr (45 theoretical + 30 practical) / 4 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Ass.prof. Dr. Zeyad Salih Fadhil					
Email: zeyadsalih@utq.edu.iq					
					
8. Course Objectives					
Course Objectives			Providing students and support their information's with analytical chemistry.		
9. Teaching and Learning Strategies					
Strategy		Providing students with a theoretical and practical background in Analytical chemistry			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learnin g method	Evaluation method
1	4		Review of elementary concep important to analytical chemistry: Strong and weak electrolytes; Important weight concentration units.	Theoretical lectures	Oral, written Exam

2-5	10		the evaluation of analytical data Definition of terms, An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods; gravimetric factor.	=	=
6	4		The scope of applications of gravimetric analysis: Inorganic precipitating agents organic precipitating agents.	=	=
7-8	5		An introduction to volumetric methods of analysis: Volumetric calculations; acid-base equilibrium and pH calculations.	=	=
9	3		Buffer solutions: Theory of neutralization titrations of simple system.	=	=
10-11	5		Theory of neutralization titrations of complex system; Precipitation titrations.	=	=
12	4		Calculation of pH in complex system; Volumetric methods based on complex system.	=	=
13-14	6		Equilibria in oxidation-reduction system; theory of oxidation-reduction titrations.	=	=
15	4		Spectrophotometric analysis: An introduction to optical methods of analysis; Methods based on absorption of radiation.	=	=

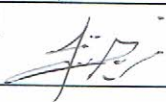
11. Course Evaluation

Midterm exam	20 marks
Reports	5 marks
Quizzes	5 marks
Practical exam	10 marks
Final exam	60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of analytical Chemistry skoog and west
Main references (sources)	Fundamentals of analytical Chemistry skoog and west
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:					
Advanced Pharmaceutical Analyses					
2. Course Code:					
3. Semester / Year:					
2 nd semester / 5 th year					
4. Description Preparation Date:					
24/ 2/ 2024					
5. Available Attendance Forms:					
scientific lectures and practical experiments					
6. Number of Credit Hours (Total) / Number of Units (Total)					
75 hr (45 theoretical + 30 practical) /4 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Ass.prof. Dr. Zeyad Salih Fadhil					
Email: zeyadsalih@utq.edu.iq 					
8. Course Objectives					
Course Objectives			Spectrophotometric analysis: An introduction to optical methods of analysis; Methods based on absorption of radiation.		
9. Teaching and Learning Strategies					
Strategy		Providing students with a theoretical and practical background of spectrophotometric methods.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6		UV / visible spectroscopy; Sample handling and instrumentation; Characteristic absorption of organic compounds; Rules for calculation of lambda max and application; Application of UV/visible;spectroscopy; Problems and solutions. Infra Red spectroscopy (theory and H-bonding effect; Sampling techniques and interpretation of	Theoretical lectures	Oral, written Exam
					=

3-7	14		spectra; Characteristic group frequencies of organic compounds; Application of IR spectroscopy; Problems and solutions.	=	
8-10	12		H ¹ -Nucleomagnetic Resonance (NMR) and C ¹³ -NMR spectroscopy; Introduction, the nature of NMR absorption, chemical shifts and factors affecting them, information obtained from NMR spectra, more complex spin-spin splitting pattern application of H ¹ -NMR spectroscopy; C ¹³ -NMR spectroscopy: introduction and characteristics, DEPT C ¹³ -NMR spectroscopy.	=	=
11-14	11		Mass spectroscopy: Introduction and interpreting Mass spectra; interpreting Mass spectra fragmentation patterns, Mass behavior of some common function groups.	=	=
15	2		elemental microanalysis CHNSO	=	=

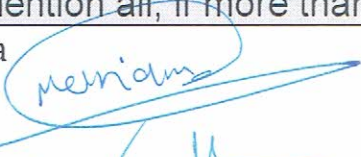

11. Course Evaluation

Midterm exam	20 marks
Reports	5 marks
Quizzes	5 marks
Practical exam	10 marks
Final exam	60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-Organic of Identification Spectrometric Compounds by Silverstein, Bassler and Morrill -Applications of absorption spectroscopy of organic compounds by Dyer JR ;Organic Chemistry by McMurry; 5thed Thomason learning CA, USA 2000
Main references (sources)	-Organic of Identification Spectrometric Compounds by Silverstein, Bassler and Morrill -Applications of absorption spectroscopy of organic compounds by Dyer JR ;Organic Chemistry by McMurry; 5thed Thomason learning CA, USA 2000
Recommended books and references	

Course Description Form

1. Course Name:					
Organic chemistry III					
2. Course Code:					
/					
3. Semester / Year:					
2 nd Semester 2024/ 2 nd Year					
4. Description Preparation Date:					
18/2/2024					
5. Available Attendance Forms:					
2 hours weekly					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 hours : 30 hours theoretical + 30 hours practical / 30 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Mariam Alwan Abdulridha					
Email: mariamalwan@utq.edu.iq 					
Name: Muntaha Uaseen Hial					
Email: muntaha84chem@sci.utq.edu.iq 					
8. Course Objectives					
Course Objectives	<ul style="list-style-type: none"> Helping the student to know the heterocyclic organic compounds, their classification, general structure, properties and applications..... Knowledge of the five-ring furan, pyrrole, and thiophene, their source interactions, and preparation methods..... Knowledge of hexagonal heterocyclic rings, methods of preparing them and reactions..... 				
9. Teaching and Learning Strategies					
Strategy	Using smart screens Conduct laboratory experiments Discussion panels				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2hours	Classification heterocyclic aromatic rings their general structure	Heterocyclic system	Smart screen + theoretical lectures	Examples/ assignment/ daily exam

2	2hours	general characteristics, nomenclature and applications	Five and six heterocyclic rings	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
3	2hours	Pyrrole, furan and thiophene	Five-membered ring heterocyclic compound	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
4	2hours	General properties	General structure	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
5	2hours	Source of pyrrole	Source of Five-membered heterocyclic ring	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
6	2hours	Electrophilic substitution in pyrrole, Furan and thiophene	Electrophilic substitution	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
7	2hours	Reactivity and Orientation in pyrrole, Furan and thiophene	Reactivity In Five-membered heterocyclic ring	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
8	2hours	Six-membered ring heterocyclic compounds	Six-membered ring heterocyclic compounds (pyridine)	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
9	2hours	Pyridine structure	Pyridine (structure and reactions)	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
10	2hours	Saturated five-membered heterocyclic compounds (pyrrolidine)	Saturated five-membered heterocyclic compounds (pyrrolidine)	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
11	2hours	Tetrahydrofuran	Tetrahydrofuran	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
12	2hours	Tetrahydrothiophene	Tetrahydrothiophene	Smart screen + theoretical lectures	Examples/ assignment/ daily exam

13	2hours	Heterocyclic of five-member rings with two heteroatoms	Heterocyclic of five-member rings with two heteroatoms	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
14	2hours	Heterocyclic of five-member rings with three heteroatom	Heterocyclic of five-member rings with three heteroatoms	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
15	2hours	Heterocyclic of Five and Six-member rings with two and three heteroatoms	Heterocyclic of Five and Six-member rings with two and three heteroatoms	Smart screen + theoretical lectures	Examples/ assignment/ daily exam
16					Final Exam

Theoretical :Mid 20 degree

Practical : 20 degree (5 degree daily exam,10 degree report, 5 degree collective exam)

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	None
Main references (sources)	Morsrison and Boyd-Organic Chemistry
Recommended books and references (scientific journals, reports...)	-----
Electronic References, Websites	-----

Course Description Form to the academic year 2023-2024

1. Course Name:	
Organic pharmaceutical chemistry-III	
2. Course Code:	
3. Semester / Year:	
4 th year 2 nd semester	
4. Description Preparation Date:	
24/2/2024	
5. Available Attendance Forms:	
In-person/integrated electronic and remote in cases of holidays and make-up lessons	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 hours (45 theoretical + 30 practical)/4 credits	
7. Course administrator's name (mention all, if more than one name)	
Name: Fadil Mohsen Hamed Email: fadilmohsen@utq.edu.iq	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none">• Providing students with a sound theoretical background in the principles of organic pharmaceutical chemistry, on the basis of which the student studies the chemical families of drugs that are used in the fields of various antibiotics, antiviral, antifungal, and antitumor agents, their modes of action, metabolic effects on them, and what is related to their pharmacokinetics in terms of chemical and stereochemical structure. The role of medicinal chemistry in the discovery and development of synthetic therapeutic agents. It also enables students to understand the concept of structure-activity relationships and its application in the design and synthesis of new chemotherapeutic agents and hormone derivatives with potential biological activity.• The goal is to teach the student how to discover and develop new drugs to treat diseases and the ability to translate the synthetic formula of the treatment into the expected effectiveness of this treatment or drug, in addition to focusing on the methods used to prepare some pharmaceutical materials by predicting the biological response, if any, from the chemical composition and identifying Chemistry of the

different groups of studied drugs and the relationship between the chemical structure and biological activity of the drugs.

- Explain how to avoid unwanted side effects of the studied medications.
- Preparation of some simple drugs like aspirin, paracetamol,..etc..
- The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.

9. Teaching and Learning Strategies

Strategy	<ul style="list-style-type: none"> • A series of theoretical lectures that are delivered in classrooms in person, in which in-person teaching methods are used, enhanced by interactive learning means such as interactive whiteboards, electronic programs, and display screens, enhanced by blended distance learning (e-learning), in which the study lectures are provided with video explanations, and educational means enhanced by questions and assignments. Home lessons, educational and short films, and illustrations for each of the above chapters. • Discussion circles prepared by students under the supervision of teachers for the purpose of enhancing the scientific material with everything that is new related to the studied or related topics. • Read methodological and helpful books to enhance self-learning ability. • Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports. • Participate in scientific discussions through questions related to the subject that are presented for discussion within the discussion for the purpose of teaching students the methods and principles of scientific discussions and debate.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Identifying the beta-lactam family of antibiotics	beta-lactam antibiotics (penicillins); Chemical classification and mechanism of action of penicillin. And the development of <i>beta-lactam drugs</i> and penicillin interactions with electron-hunting and nucleus-hunting groups and penicillin acid sensitivity.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

3	3	Identifying the beta-lactam family of antibiotics (penicillins)	Bioavailability: Acid stability of penicillins; Oral activity of broad-spectrum penicillins Bacterial resistance and beta-lactamase inhibitors: clavulanic acid.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	3	Identifying the beta-lactam family of antibiotics (cephalosporins and monobactams)	Cephalosporins. Functional groups of cephalosporins (pharmacophore); Specific absorption rate of cephalosporins; Mechanism of peptidase inhibition Mechanism of action of cephalosporin and monobactam (SAR) chemical classification Mechanism of action Microbial resistance	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	3	Identifying the beta-lactam family of antibiotics (cephalosporins and monobactams)	Generations 1 to 5 of cephalosporins, carbapenems, monobactams, and marketed pharmaceutical products.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
6	2	Get knowledge about sulfa drugs.	Antibacterial sulfonamides (sulfa drugs); (Chemistry, nomenclature, mechanism of action, resistance, toxicity, side effects, metabolism, protein binding, distribution, SAR.) Marketed pharmaceutical compounds and sulfonates	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
6-7	5	Identifying the tetracycline and macrolide families	Tetracycline. Macrolides Chemical	Theoretical lectures using various scientific methods and	Oral, written and surprise examinations and various other

			classification and mechanism of action SAR, microbial resistance, commercial production and chloramphenicol	means of explanation, electronic, in-person and combined	means of testing
Mid-term exam (2 weeks)					
7-8	5	Identifying the amino glycosides and lincomycin families	Amino glycosides. SAR chemical classification. Mechanism of action, microbial resistance and commercial production. Lincomycin and polypeptides. Chemical classification, mechanism of action of SAR, microbial resistance and commercial production.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
9-8	3	Learn about the fluoroquinolone family	Fluoroquinolone chemical classification SAR. Mechanism of action, microbial resistance and commercial production.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
9-10	5	Learn about antiviruses	Antiviral agents, classification and biochemistry of viruses. The goal of viral infection. Classification of antiviral drugs. The apparent structure of some antiviral nucleoside analogues and nucleotides.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
11-12	6	Identification of families of chemical antineoplastic agents	Antitumor agents: (alkylating agents), (plant products), and (antimetabolites) (Antibiotics), (Protein kinase	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

			inhibitors) and various other agents), (Hormones and their families), and the future of cancer treatment: monoclonal antibodies and gene therapy.		
12-13	4	Identify antifungal agents and their chemistry and SAR	Antifungal agents, biochemical targets of antifungal chemotherapy. Classification of antifungal drugs (SAR).	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 5 marks, home work assignments 5 marks, mid-term exam 10 marks, practical organic pharmaceutical chemistry-I 20 marks, final term exam 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Wilson and Gisvold Textbook of Organic medicinal Pharmaceutical chemistry, Delgado JN, Remers WA, (E (LATEST EDDITION).
Main references (sources)	1. Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); (LATEST EDDITION). 2. The Organic Chemistry Of Drug Synthesis. 3. Faye's Principles of Medicinal Chemistry by David Williams and Thomas L.Lemke.
Recommended books and references (scientific journals, reports...)	-----
Electronic References, Websites	-----

Course Description Form to the academic year 2023-2024

1. Course Name:

Organic pharmaceutical chemistry IV

2. Course Code:

3. Semester / Year:

5th year 1st semester

4. Description Preparation Date:

24/2/2024

5. Available Attendance Forms:

In-person/integrated electronic and remote in cases of holidays and make-up lessons

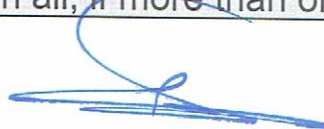
6. Number of Credit Hours (Total) / Number of Units (Total)

30 hours (30 theoretical + 0 practical) / 2 credits

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

Name: Hussein Ali Al-Sa'idy

Email: hussein-a-h@utq.edu.iq



8. Course Objectives

Course Objectives

- Providing students with a sound theoretical background in the principles of organic pharmaceutical chemistry, on the basis of which the student studies classification, synthesis, biotransformation and/or formulation of some drugs to improve their action as well as to avoid some side effects through chemical modification methods to influence drug kinetics, metabolism and biological effectiveness to prepare better drugs than In terms of strength, pharmacokinetics, less side effects and toxicity, synthesis chemistry for drug discovery, and the use of polymers to prepare drugs chemically.
- Study of combinatorial chemistry for the purposes of exploring and manufacturing medicines.

9. Teaching and Learning Strategies

Strategy

- A series of theoretical lectures that are delivered in classrooms in person, in which in-person teaching methods are used, enhanced by interactive learning means such as interactive whiteboards, electronic programs, and display screens, enhanced by blended distance learning (e-learning), in which the study lectures are provided with video explanations, and educational means enhanced by questions and assignments. Home lessons, educational and short films, and illustrations for each of the above chapters.
- Discussion circles prepared by students under the supervision of teachers for the purpose of *enhancing the scientific material with everything that is new related to the studied or related topics.*
- Read methodological and helpful books to enhance self-learning ability.
- Participate in scientific discussions through questions related to the subject that are

presented for discussion within the discussion for the purpose of teaching students the methods and principles of scientific discussions and debate.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to drug derivatives	Introduction to pharmaceutical derivatives	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
2	2	Introducing the active groups in drug derivatives and amines	Active groups in drug derivatives and amines	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
3	2	Introduction to biological precursors and the chemical delivery system for drugs	Bioprecursors and chemical delivery system for drugs	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	2	Introduction to polymeric drug derivatives	Polymeric drug derivatives	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	2	Definition of methods Design and manufacture of polymeric drug derivatives	Design and manufacture of polymeric drug derivatives	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
Mid-term exam (2 weeks)					
6	3	Introduction to combinatorial chemistry and its principles	Combinatorial chemistry and its principles	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
7	3	Introduction to combinatorial chemistry methods: peptides and peptoids as an example	Combinatorial chemistry methods: Peptides and peptoids are a model	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
8	3	Introduction to support bonds and soluble	Supporting bonds and soluble polymers	Theoretical lectures using various	Oral, written and surprise examinations

		polymers		scientific methods and means of explanation, electronic, in-person and combined	and various other means of testing
9-10	3	Introduction to methods of detection, purification, analysis, and dual approaches	Detection, purification, analysis and dual approaches	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
10-12	6	Introduction to the high-throughput screening methods and high-throughput screening; Examination Hypothetical chemical diversity and Chemical library design	High-throughput screening and high-throughput screening; Examination Hypothetical chemical diversity and chemical library design	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 5 marks, home work assignments 5 marks, mid term exam 20 marks, final term exam 70 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Wilson and gisvold textbook of organic medicinal and pharmaceutical chemistry : Delgado , JN, remers WA, (Eds);10 th ed, 4112
Main references (sources)	1. Wilson and gisvold textbook of organic medicinal and pharmaceutical chemistry : Delgado , JN, remers WA, (Eds);10 th ed, 4112
Recommended books and references (scientific journals, reports...)	-----
Electronic References, Websites	-----

Course Description Form to the academic year 2023-2024

1. Course Name:	
Organic pharmaceutical chemistry-II	
2. Course Code:	
3. Semester / Year:	
First semester/ Fourth Year	
4. Description Preparation Date:	
24/2/2024	
5. Available Attendance Forms:	
In-person/integrated electronic and remote in cases of holidays and make-up lessons	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 hours (45 theoretical + 30 practical)/four credits	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein Ali Al-Sa'idy Email: hussein-a-h@utq.edu.iq Name: Fadil Mohsen Hamed Email: fadilmohsen@utq.edu.iq	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none">• Providing students with a sound theoretical background in the principles of organic pharmaceutical chemistry, on the basis of which the student studies the chemical families of drugs that are used in various therapeutic fields, including the effectiveness of nervous system drugs, analgesics, and hormones, their methods of action, the metabolic effects on them, and what is related to their pharmacokinetics in terms of chemical and stereochemical composition.• Prepare some simple medicines.• The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.
9. Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none">• A series of theoretical lectures that are delivered in classrooms in person, in which in-person teaching methods are used, enhanced by interactive learning means such as interactive whiteboards, electronic programs, and display screens, enhanced by blended distance learning (e-learning), in which the study lectures are provided with video explanations, and educational means enhanced by questions and assignments. Home lessons, educational and short films, and illustrations for each of the above chapters.• Discussion circles prepared by students under the supervision of teachers for the purpose of enhancing the scientific material with everything that is new related to the studied or related topics.• Read methodological and helpful books to enhance self-learning ability.

- Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports.
- Participate in scientific discussions through questions related to the subject that are presented for discussion within the discussion for the purpose of teaching students the methods and principles of scientific discussions and debate.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction to cholinergic factors and cholinergic receptors related to the parasympathetic system	Cholinergic factors, cholinergic receptors and their subtypes. Stereochemistry and structure-activity relationships: drug products.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
2	3	Introduction to the relationship between chemical structure, stereology, and biological activity	Cholinergic stimulants. Stereochemistry and structure-activity relationships (SAR)	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
3	3	Introduction to medications to treat diseases related to the parasympathetic system	Cholinesterase inhibitors. Structure-activity relationships of alkaloids of the Solanaceae family and their analogues as an example	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	3	Introduction to medications to treat diseases related to the parasympathetic system	Synthetic cholinergic blocking agents: pharmaceutical products	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	3	Introduction to medications to treat diseases related to the parasympathetic system	Ganglion blocking agents (neuromuscular blocking agents). Composition, physical and chemical properties, storage,	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

			biosynthesis, release, absorption and metabolism		
6	3	Introduction to adrenergic factors and their receptors related to the sympathetic system	Adrenergic factors (adrenergic neurotransmitters) alpha adrenergic receptors, beta adrenergic receptors Drugs affecting the biosynthesis of catecholamines	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
Mid-term exam					
7	3	Introduction to medications to treat diseases related to the sympathetic system	Drugs affecting the storage and release of catecholamines, direct-acting sympathomimetics (endogenous catecholamines (SAR)) Adrenergic receptor antagonists and agents	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
8-9	6	Introduction to medications to treat diseases related to the sympathetic system	Alpha adrenergic receptor agonists. Beta-adrenergic receptor agonists and indirect-acting sympathomimetics . Alpha blockers. Non-selective alpha blockers, irreversible alpha blockers, selective alpha 1 blockers. Beta blockers, non-selective beta blockers. Structure-activity relationships	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
9	3	Introduction to medications to treat diseases related to the central nervous system	Central nervous system depressants, benzodiazepines and related compounds With skeletal muscle relaxant properties. Antipsychotics. Anticonvulsants.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

10	4	Introducing medications to treat diseases related to the central nervous system	Central nervous system stimulants: 1. Painkillers 2. Methylxanthines 3. Sympathetic central nervous system agents (psychomotor stimulants) Structure-activity relationship and mechanism of action of antipsychotics.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
11	4	Introducing medications to treat diseases related to the central nervous system	Antidepressants : 1. Monoamine oxidase inhibitors 2. Monoamine reuptake inhibitors 3. Selective serotonin reuptake inhibitors 4. Selective norepinephrine reuptake inhibitors	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
12	4	Introducing medications to treat diseases related to the central nervous system	Palliative agents: Morphine and its derivatives and <i>meperidine</i> -type molecules; For methadone-type compounds; Pasomorphan, an anti-benzomorphan type analgesic (SAR) Analgesic receptors: endogenous opioids: antitussive products and agents	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and <i>various other</i> means of testing
13	4	Introduction to all types of anti-inflammatory drugs and steroid hormones	Steroid-free anti-inflammatory drugs (NSAIDs) Mechanism Work and Criminal effects. Steroidal and non-steroidal	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

			hormones Biological activities of mineralocorticoids , glucocorticoids and steroids Sex hormones, progestins and androgens		
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11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 4 marks, home work report 3 marks, practical part 20 marks, mid-term exam: 13 marks, final term exam: 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Wilson and Gisvold's Textbook of Organic Medic and Pharmaceutical Chemistry (LATEST EDDITION)
Main references (sources)	1. Wilson and Gisvold's Textbook of Organic Medic and Pharmaceutical Chemistry (LATEST EDDITION)
Recommended books and references (scientific journals, reports...)	1. The Organic Chemistry Of Drug Synthesis.
Electronic References, Websites	-----

Course Description Form to the academic year 2023-2024

Course Name:
Inorganic pharmaceutical chemistry
Course Code:
Semester / Year:
1 st semester / Third Year
Description Preparation Date:
24/2/2024
Available Attendance Forms:
In-person/integrated electronic and remote in cases of holidays and make-up lessons
Number of Credit Hours (Total) / Number of Units (Total)
60 hours (30 theoretical + 30 practical)/3 credits
Course administrator's name (mention all, if more than one name)
Name: Hussein Ali Al-Sa'idy Email: hussein-a-h@utq.edu.iq

Course Objectives

Course Objectives

- Providing students with a sound theoretical background in the principles of organic chemistry, on the basis of which the student studies the structure of the atom for the purposes of studying pharmaceutical preparations and medicines that are prepared in the form of chemical complexes, radiopharmaceutical preparations and their therapeutic purposes for detecting and treating cancerous diseases, the main minerals in the body and trace elements and their benefits as drug supplements and the principles of treating poisoning with heavy metals. And trace by chemical complex compounds (antitoxins).
- Methods for finding the concentrations of standard pharmaceutical solutions using the qualitative chemical method
- The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.

Teaching and Learning Strategies

Strategy

- A series of theoretical lectures that are delivered in classrooms in person, in which in-person teaching methods are used, enhanced by interactive learning means such as interactive whiteboards, electronic programs, and display screens, enhanced by blended distance learning (e-learning), in which the study lectures are provided with video explanations, and educational means enhanced by questions and assignments. Home lessons, educational and short films, and illustrations for each of the above chapters.
- Discussion circles prepared by students under the supervision of teachers for the purpose

of enhancing the scientific material with everything that is new related to the studied or related topics.

- Read methodological and helpful books to enhance self-learning ability.
- Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports.
- Participate in scientific discussions through questions related to the subject that are presented for discussion within the discussion for the purpose of teaching students the methods and principles of scientific discussions and debate.

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	6	Introduction to chemical complexes and methods of their formation	Atomic and molecular structure of complexes	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4-6	5	Introducing the essential and trace elements and ions in the human body and their importance to life processes and their toxicity	Essential and trace elements and ions in the human body	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
7	2	Introducing the essential and trace elements and ions in the human body and their importance to life processes and their toxicity	Non-essential ions: fluoride, bromide, lithium, gold, silver, and mercury	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
Mid-term exam (2 weeks)					
8	4	Identifying gastrointestinal agents: acidifying agents, antacids, anti-flatulants, and laxatives, their uses, chemistry, side effects, and drug interactions from a chemical standpoint.	Identifying gastrointestinal agents: acidifying agents, antacids, anti-flatulants, and laxatives, their uses, chemistry, side effects, and drug interactions from a chemical standpoint.	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
9-11	6	Radiopharmaceutical equipment, methods	Identify radiopharmaceutical	Theoretical lectures using various	Oral, written and surprise

		of manufacturing and uses	devices, their manufacturing methods, and their medical uses	scientific methods and means of explanation, electronic, in-person and combined	examinations and various other means of testing
11-12	4	Radiation-blocking materials, insulation agents and their medical uses	Identify radiation-blocking materials, insulation agents, and their medical uses	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
12	3	Skin and dental factors	Identify skin and dental factors	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student: sudden quizzes 4 marks, home work report 3 marks, practical part 20 marks, mid-term exam: 13 marks, final term exam: 60 marks.

Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ol style="list-style-type: none"> 1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry 12^{ve} ed. John M. Beale, Jr., John H Block. 2. Inorganic Medicinal and Pharmaceutical Chemistry by Block, Roche Soine and Wilson, latest edition. 3. hand book of practical inorganic pharmaceutical chemistry (practical)
Main references (sources)	<ol style="list-style-type: none"> 1. Foye's Principles of Medicinal Chemistry by David A Williams and Thomas L. Lemke. 2. Selected Experiments of pharmaceutical analysis Anees A. Siddiqui. First Edition, 2010. (practical)
Recommended books and references (scientific journals, reports...)	-----
Electronic References, Websites	-----

Course Description Form to the academic year 2023-2024

1. Course Name:	
Organic pharmaceutical chemistry-I	
2. Course Code:	
3. Semester / Year:	
2 nd semester / Third Year	
4. Description Preparation Date:	
24/2/2024	
5. Available Attendance Forms:	
In-person/integrated electronic and remote in cases of holidays and make-lessons	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 hours (45 theoretical + 30 practical)	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein Ali Al-Sa'idy Email: hussein-a-h@utq.edu.iq	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none">• Providing students with a sound theoretical background in the principles of organic pharmaceutical chemistry, on the basis of which the student studies the principles of drug design using the usual and modern methods using computer simulations, the method of action of the drug compound inside the body, binding to biological receptors from the chemical side, the effect of the chemical composition on drug kinetics inside the body, and the body's effect on metabolic processes on Chemical composition of drugs and expected effects.• Prepare some simple medicines.• The student is taught laboratory safety rules, and the safe handling of chemicals, glassware, laboratory equipment and supplies.
9. Teaching and Learning Strategies	
Strategy	<ul style="list-style-type: none">• A series of theoretical lectures that are delivered in classrooms in person, in which in-person teaching methods are used, enhanced by interactive learning means such as interactive whiteboards, electronic programs, and display screens, enhanced by blended distance learning (e-learning), in which the study lectures are provided with video explanations, and educational means enhanced by questions and assignments. Home lessons, educational and short films, and illustrations for each of the above chapters.• Discussion circles prepared by students under the supervision of teachers for the purpose of enhancing the scientific material with everything that is new related to the studied or related topics.

- Read methodological and helpful books to enhance self-learning ability.
- Organizing a series of practical laboratory experiments designed to enhance understanding of the theoretical material, including conducting experiments and teaching how to safely deal with chemicals, laboratory devices and equipment, teaching how to work in small and individual work teams, and teaching how to prepare practical experiment reports.
- Participate in scientific discussions through questions related to the subject that are presented for discussion within the discussion for the purpose of teaching students the methods and principles of scientific discussions and debate.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Know the effect of chemical structure on drug kinetics	Drug distribution and pharmacokinetics	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
2	3	Knowing the effect of acidity and basicity on drug ionization and its kinetics	Acid and base properties of drugs	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
3	4	Knowing the physical bonds between molecules and their relationship to drug binding to receptors	The forces involved in the binding process between the drug and the receptor	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
4	3	Know the effect of the size of the drug molecule on its function and kinetics	Stereoscopic factors and their effect on the action of drugs	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
5	3	Knowing the effect of stereoisomers on drug function and its	Visual analogues and their effect on drug function and kinetics	Theoretical lectures using various scientific	Oral, written and surprise examinations

		kinetics		methods and means of explanation, electronic, in-person and combined	and various other means of testing
6	3	Identify the principles of chemical isosterism and its effect on the binding of drugs to receptors and the development of new drugs	Isosterism and its effect on the binding of drugs to receptors and the development of new drugs	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
Mid-term exam (2 weeks)					
7-11	22	The effect of the chemical composition of the drug on the metabolism of drugs and the chemical changes they occur within the body	Drug metabolism	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing
12	3	Know the multiple factors that affect drug metabolism	Factors affecting drug metabolism	Theoretical lectures using various scientific methods and means of explanation, electronic, in-person and combined	Oral, written and surprise examinations and various other means of testing

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as: sudden quizzes 5 marks, home work assignments 5 marks, mid term exam 10 marks, practical organic pharmaceutical chemistry-I 20 marks, final term exam 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011. 2. Practical pharmaceutical chemistry A.H. Beckett ,J.B. Stenlake. First Edition.(practical)
Main references (sources)	1. Foye's Principles of Medicinal Chemistry by (David A.) Williams and Thomas L. Lemke. 2. Selected Experiments of pharmaceutical analysis Anees A.Siddiqui. First Edition,2010. (practical)
Recommended books and references (scientific journals, reports...)	1. Pharmaceutical drug analysis, By Ashutosh K. second edition 2005.
Electronic References, Websites	-----