Academic Program Description Form

University Name: Al-Nahrain university

Faculty/Institute: Faculty of pharmacy

Scientific Department: Pharmaceutical chemistry department

Academic or Professional Program Name: Bachelor

Final Certificate Name: Bacheloria degree

Academic System: semesters

Description Preparation Date: 28/02/2024

File Completion Date: 25/04/2024

Signature:

Head of Department Name: Dr. Ahmed Thamer Salim

Date: 25/04/2024

Signature:

Scientific Associate Name: Dr. Rafal Shakeeb

Date: 25/04/2024

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department: Dr. Noor Adil Abood

Date: 25/04/2024

Signature:

كلية الصيدلة
جامعة النهرين
مكتب العميد
COLLEGE OF PHARMACY
AL-NAHRAIN UNIVERSITY

Approval of the Dean

Prof. Dr. Hayder B [illegible]

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

Academic Program and Course Description Guide

2024

Introduction:

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

1. Program Vision

The vision of pharmaceutical chemistry is to teach the chemistry sciences used in the medical and pharmaceutical fields, to link the chemistry of medicines to therapeutic actions, to study the relationship between the structural formulation of medicines and their biological impact, as well as to structural analysis of medicines through the use of spectroscopy.

2. Program Mission

The letter from the Pharmaceutical Chemistry Department contained two objectives, one of which relates to the task of education and training. The pharmaceutical chemistry branch teaches various chemistry branches to university students: advanced pharmaceutical analyses. Analytical chemistry, organic chemistry, inorganic pharmaceutical chemistry, and organic pharmaceutical chemistry. The other objective is linked to the task of research and innovation through the performance and orientation of students ' new knowledge.

3. Program Objectives

1. providing students with a broad and diverse scientific background by Providing education and training in the scientific courses organized by the department.
2. Giving students an integrated study program. This includes an interest in drug design and discovery, organic preparation of medical and pharmaceutical elements, a study of inorganic compounds and their medical and pharmaceutical usefulness, and many other topics.
3. Activating the department's role in the quality of research and innovation.

4. Program Accreditation

This program is identical to the unified program (both theoretically and practically) applied in the colleges of pharmacy, which was adopted by the Committee of Pharmacy College Deans and approved by the Scientific Supervision and Evaluation Apparatus by its letter No. ct/203 dated 13/1/2010.

5. Other external influences

Yes, the ministry of higher education and scientific research is a sponsor for the program?

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**10**	**435**		
College Requirements	**10**	**435**		
Department Requirements	**10**	**435**		
Summer Training	–	–		
Other	–	–		

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
1st/ 1st semester		Analytical Chemistry	3 hours	2 hours
1st/ 2nd semester		Organic Chemistry 1	3 hours	2 hours
2nd/1st semester		Organic Chemistry 2	3 hours	2 hours
2nd/2nd semester		Organic Chemistry 3	3 hours	2 hours
3rd/ 1st semester		Inorganic Pharmaceutical Chemistry	3 hours	2 hours

3rd/ 2nd semester		Pharmaceutical Organic Chemistry 1	3 hours	2 hours
4th/ 1st semester		Pharmaceutical Organic Chemistry 2	3 hours	2 hours
4th/ 2nd semester		Pharmaceutical Organic Chemistry 3	3 hours	2 hours
5th/ 1st semester		Pharmaceutical Organic Chemistry 4	2 hours	
5th/ 2nd semester		Advanced Pharmaceutical Analysis	3 hours	2 hours

8. **Expected learning outcomes of the program**	
Knowledge	
Learning Outcomes 1	1- Correct handling of chemicals and glassware 2- Operate scientific equipment in the correct and appropriate manner 3- Gaining experience in using different techniques for preparing medicines and chemicals
Skills	
Learning Outcomes 2	The skills goals special to the program 1 - Acquisition of the skill on how to identify and evaluate chemical compounds 2 - Acquisition of skill in the use of various methods of preparation and manufacture of chemical compounds 3- Acquiring the skill in writing scientific reports
Ethics	
Learning Outcomes 4	1- Knowledge of the mechanisms of action of drugs 2- Knowing the factors affecting the biological activity, solubility, stability, side effects, duration of action of the drug 3- Studying the methods of chemical reactions

9. **Teaching and Learning Strategies**
1- Theoretical lectures

2- educational laboratories
3- Scientific research
4- desk research

10. Evaluation methods

1- Mid-term and final exams
2- Oral and written exams
3- Laboratory reports

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor		1			15	10
Assistant professor		1				
Teacher		3				
Assistant teacher		5				

Professional Development

Mentoring new faculty members

1- The branch head follows up on new teachers by entering the classroom during the lecture
2- Guidance in developing teaching skills
3- Encouraging the development of research skills
4- Encouraging the development of leadership skills
5- Guidance in developing practical skills
6- Encouraging decision-making skill

Professional development of faculty members
- Developing the performance and skills of teaching staff in accordance with the latest developments in teaching in the clinical laboratory fields to ensure that the branch continues on the correct scientific path. - Raising the scientific level of scientific research and participating in scientific conferences and seminars. - Encouraging the scientific and cultural activity of the teaching staff in the branch.

12. **Acceptance Criterion**
(Central admission to the Ministry of Higher Education and Scientific Research / Iraq / according to the student's grades)

13. **The most important sources of information about the program**
State briefly the sources of information about the program.

14. Program Development Plan
Syllabus development plan by adding or updating a Syllabus

Program Skills Outline														
				Required program Learning outcomes										
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics		
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year/ first semester		Analytical chemistry	Basic	√	√	√	√	√	√	√	√	√	√	√	√
First year / second semester		Organic chemistry I	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second year/first semester		Organic chemistry II	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second year / second semester		Organic chemistry III	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third year/first semester		Inorganic pharmaceutical chemistry	Basic	√	√	√	√	√	√	√	x	√	√	√	√

Third year / second semester		**Organic pharmaceutical chemistry I**	**Basic**	√	√	√	√	√	√	√	√	√	√	**x**	√
Forth year / first semester		**Organic pharmaceutical chemistry II**	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
Forth year / second semester		**Organic pharmaceutical chemistry III**	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
Fifth year / first semester		**Organic pharmaceutical chemistry IV**	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
Fifth year / second semester		**Advanced pharmaceutical analysis**	**Basic**	√	√	√	√	√	√	√	√	**x**	√	√	√

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

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Analytical Chemistry
4. Modes of Attendance offered	First Stage
5. Semester/Year	1st Semester/2022-2023
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Preparing students and supporting them with information related to qualitative and quantitative chemical analyzes and studying related theories.	

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Cognitive goals .
A1- How to deal with chemical compounds
A2- How to deal with scientific equipment
A3- Various scientific techniques
A4.
A5.
A6.

B. The skills goals special to the course.
B1- Acquisition of skill in how to deal with chemical compounds
B2- Acquiring the skill in writing scientific reports
B3.

Teaching and Learning Methods

1- Theoretical lectures
2- educational laboratories
3-Scientific Reports
4-desk research

Assessment methods

1-Mid-term and final exams
2-Oral exams and laboratory research
3-Use of scientific equipment

C. Affective and value goals
C1- Preparation of different chemical compounds and medicines
C2- Identify chemical compounds, drugs and their derivatives
C3- Performing chemical analyzes
C4.

Teaching and Learning Methods

Seminars - daily assignments - written exams

Assessment methods

Oral and written exams - scientific reports

10. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessmen t Method
1	4		Review of elementary concepts important to analytical chemistry: Strong and weak electrolytes; important weight and concentration units.	Lectures	Oral and written exam
5-2	10		The evaluation of analytical data: Definition of terms,and An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods; gravimetric factor.	Lectures	Oral and written exam
6	4		The scope of applications of gravimetric analysis: Inorganic precipitating agents; organic precipitating agents.	Lectures	Oral and written exam
8-7	5		An introduction to volumetric methods of analysis: Volumetric calculations; acid-baseequilibria and pH calculations.	Lectures	Oral and written exam
9	3		Buffer solutions: Theory of neutralization titrations of simple system.	Lectures	Oral and written exam
11-10	5		Theory of neutralization titrations of complex system; Precipitation titrations.	Lectures	Oral and written exam
12	4		Calculation of pH in complex system; Volumetric methods based on complex system.	Lectures	Oral and written exam

14–13	6		Equilibria in oxidation-reduction system; theory of oxidation-reduction titrations.	Lectures	Oral and written exam
15	4		Spectrophotometric analysis: An introduction to optical methods of analysis; Methods based on absorption of radiation.	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Fundamentals of Analytical Chemistry by Stook and West.
2. Main references (sources)	Fundamentals of Analytical Chemistry by Stook and West.
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place.

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Chemistry I
4. Modes of Attendance offered	First Stage
5. Semester/Year	2ed Semester/2022-2023
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
A study of classification, properties, preparation and reactions of alkanes, alkenes, alkynes, alcohols, ethers and benzene, and the study of stereochemistry.	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals . A1- How to deal with organic chemical compounds and their reactions. A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowledge of the methods used in the preparation of organic compounds.
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquisition of skill in the use of different methods in the manufacture and preparation of medicines B3- Acquisition of skill in how to deal with chemical compounds B4- Acquisition of skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams - scientific reports
C. Affective and value goals C1- Preparation of different chemical compounds and medicines C2- Identify chemical compounds, drugs and their derivatives C3- Performing chemical analyzes C4.
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams - scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development) D 1- Conducting scientific experiments D2- Acquisition of skill in preparing medicines D 3-Giving confidence to the student by presenting scientific research D4- Acquisition of the skill to identify and classify medicines

10. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessmen t Method
1	3		An introduction	Lectures	Oral and written exam
3-2	6		Alkanes and methane	Lectures	Oral and written exam
5-4	6		Alkenes 1 and 2	Lectures	Oral and written exam
7-6	6		Alkynes and Dienes	Lectures	Oral and written exam
9-8	6		Stereochemistry 1	Lectures	Oral and written exam
10-12	8		Alcohols and Ethers	Lectures	Oral and written exam
14-13	7		Benzene	Lectures	Oral and written exam
15	3		Cyclic alkenes	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Organic Chemistry by Robert T. Morrison and Robert N. Boyd . Organic Chemistry by McCurry; 9th ed. Thomason learning; CA,USA; 2015
2. Main references (sources)	Organic Chemistry by Robert T. Morrison and Robert N. Boyd . Organic Chemistry by McCurry; 9th ed. Thomason learning; CA,USA; 2015
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan

By adding new topics that keep pace with scientific development

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Chemistry II
4. Modes of Attendance offered	second Stage
5. Semester/Year	1st Semester/2022-2023
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Organic chemistry 1 study of classification, properties, preparation and interactions of Halidate Alkille and vacuum chemistry II, lymphids, ketones, carboxic acids, their derivatives, insiders and phenols.	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .
A1- How to deal with organic chemical compounds and their interactions.
A2- How to deal with scientific devices.
A3- Learn to use different scientific techniques.
A4- Knowing the methods used to prepare organic compounds.
A5.
A6 .

B. The skills goals special to the course.
B1 - Equalization of skill in preparing vehicles and medicines
B2 - Gain skill in using different methods in manufacturing and preparing medicines
B3 - Gain skill in how to deal with chemical compounds
B4- Gain skill in writing scientific reports.

Teaching and Learning Methods

Seminars - daily assignments - written exams

Assessment methods

Oral and written exams-scientific reports

C. Affective and value goals
C1-Preparing chemical compounds and various medicines
C2-Learn about chemical compounds and medicines and their derivatives
C3-Chemical tests
C4-

Teaching and Learning Methods

Seminars - daily assignments - written exams

Assessment methods

Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development) D1-Conducting scientific experiments D2-Equalization of skill in preparing medicines D3- Granting confidence to the student by delivering scientific research D4-Equalization of skill to detect and classify medicines

10. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
3-1	6		Alkyl halides.	Lectures	Oral and written exam
3-4	5		Stereochemistry II.	Lectures	Oral and written exam
7-5	12		Aldehydes and ketones (include also aldol and Claisen condensation); Classification, reactions and properties.	Lectures	Oral and written exam
9-8	5		Carboxylic acids: properties and reactions.	Lectures	Oral and written exam
11-10	6		Functional derivatives of carboxylic acids.	Lectures	Oral and written exam
13-12	6		Amines I and II.	Lectures	Oral and written exam
15-14	5		Amines I and II.	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Organic Chemistry by Robert T. Morrison and Robert N. Boyd . Organic Chemistry by McCurry; 9th ed. Thomason learning; CA,USA; 2015
2. Main references (sources)	Organic Chemistry by Robert T. Morrison and Robert N. Boyd . Organic Chemistry by McCurry; 9th ed. Thomason learning; CA,USA; 2015
A- Recommended books and references (scientific journals, reports…).	

B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development.

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Chemistry III
4. Modes of Attendance offered	second Stage
5. Semester/Year	2ed Semester/2022-2023
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Organic Chemistry 3 Study of classification, properties, preparation and reactions of heterogeneous organic compounds	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the methods used in preparing medicines A5. A6.
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquisition of skill in the use of different methods in the manufacture and preparation of medicines B3- Acquisition of skill in how to deal with chemical compounds B4- Acquiring the skill in writing scientific reports..
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1- Preparation of different chemical compounds and medicines C2- Identify chemical compounds, drugs and their derivatives C3- Performing chemical analyzes C4.
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1-Conducting scientific experiments
D2-Equalization of skill in preparing medicines
D3- Granting confidence to the student by delivering scientific research
D4-Equalization of skill to detect and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-4	13		Heterocyclic system: Classes of heterocyclic systems; general structures; properties; Occurrence in nature and in medicinal products.	Lectures	Oral and written exam
5	3		Five-membered ring heterocyclic compounds: pyrrole; furan and thiophen.	Lectures	Oral and written exam
6	3		Source of pyrrole, furan and thiophen.	Lectures	Oral and written exam
9-7	8		Electrophilic substitution in pyrrole, furan and thiophen: Reactivity and orientation.	Lectures	Oral and written exam
10	2		Six-membered ring heterocyclic compounds: Structure of pyridine.	Lectures	Oral and written exam
11	1		Basicity of pyridine.	Lectures	Oral and written exam
13-11	7		Reactions of pyridine.	Lectures	Oral and written exam
15-14	8		Saturated five-membered heterocyclic compounds.	Lectures	Oral and written exam

11. Infrastructure

1. Books Required reading:	Organic Chemistry by Robert T. Morrison and Robert N. Boyed, latest edition. Organic Chemistry by J. McMurry, latest ed., Thomason learning, CA, USA.

	An introduction to the chemistry of heterocyclic compound by Acheson, R. M. latest ed.
2. Main references (sources)	Organic Chemistry by Robert T. Morrison and Robert N. Boyed, latest edition. Organic Chemistry by J. McMurry, latest ed., Thomason learning, CA, USA. An introduction to the chemistry of heterocyclic compound by Acheson, R. M. latest ed.
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development.

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Inorganic Pharmaceutical Chemistry
4. Modes of Attendance offered	3rd Year
5. Semester/Year	1st Semester
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Inorganic Pharmaceutical Chemistry The study of inorganic chemical compounds and their uses in medical diagnosis and treatment.	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the methods used in preparing medicines A5. A6 .
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquisition of skill in the use of different methods in the manufacture and preparation of medicines B3- Acquisition of skill in how to deal with chemical compounds B4- Acquisition of skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1-Preparation of inorganic chemical compounds and various medicines C2-Identification of inorganic chemical compounds, medicines and their derivatives C3- Performing chemical analyzes C4.
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3-Giving confidence to the student by presenting scientific research
D4- Acquisition of the skill to identify and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	5		Atomic and molecular structure/ Complexation.	Lectures	Oral and written exam
3	2		Major intra and extra cellular electrolytes.	Lectures	Oral and written exam
4	2		Major physiological ions.	Lectures	Oral and written exam
5	2		Electrolytes used for replacement therapy.	Lectures	Oral and written exam
5	2		Electrolytes used in acid- base balance.	Lectures	Oral and written exam
6-7	7		Essential and trace ions: Iron, copper, sulfur, iodine.	Lectures	Oral and written exam
8-9	6		Non essential ions: Fluoride, bromide, lithium, gold, silver and mercury.	Lectures	Oral and written exam
10	2		Gastrointestinal agents.	Lectures	Oral and written exam
11	2		Acidifying agents.	Lectures	Oral and written exam
11	2		Antacids.	Lectures	Oral and written exam
12	2		Protective adsorbents.	Lectures	Oral and written exam
13	2		Radiopharmaceutical preparations.	Lectures	Oral and written exam
13-15	7		Radio opaque and contrast media.	Lectures	Oral and written exam

11. Infrastructure

1. Books Required reading:	Inorganic Medicinal and Pharmaceutical Chemistry by Block, Roche Soine and Wilson, latest edition Wilson and Gisvold; Textbook of Organic

	medicinal and Pharmaceutical chemistry; Delgado JN, Remers WA, (eds); latest edition
2. Main references (sources)	Inorganic Medicinal and Pharmaceutical Chemistry by Block, Roche Soine and Wilson, latest edition Wilson and Gisvold; Textbook of Organic medicinal and Pharmaceutical chemistry; Delgado JN, Remers WA, (eds); latest edition
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Inorganic Pharmaceutical Chemistry
4. Modes of Attendance offered	3rd Year
5. Semester/Year	2ed Semester
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Organic Pharmaceutical Chemistry 1 A study of the mechanism of action of the drug and the factors that affect it, in addition to the study of the metabolism of chemical compounds and drugs	

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the factors that affect the stability, solubility and absorption of drugs A5- Knowing the mechanism of action of the drug and the relationship of the chemical structure to that A6- Knowledge of the methods used in the preparation of medicines
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquire skill in using different methods in manufacturing and preparing medicines B3- acquiring the skill in how to deal with chemical compounds B4- Gaining the skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1- Knowing the methods of designing drugs and chemical compounds C2- Knowledge of methods of laboratory synthesis of drugs and chemical compounds C3- Learn the methods of laboratory analysis to know the composition of chemical compounds C4- Preparing various medicines
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3- Giving confidence to the student by presenting scientific research
D4- Acquiring the skill to detect and classify drugs

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4		Drug distribution.	Lectures	Oral and written exam
2	3		Acid- base properties.	Lectures	Oral and written exam
3	3		Statistical prediction of pharmacological activity.	Lectures	Oral and written exam
4	2		QSAR models.	Lectures	Oral and written exam
5	1		Molecular modeling (Computer aided drug design).	Lectures	Oral and written exam
5	1		Drug receptor interaction: force involved.	Lectures	Oral and written exam
5	2		Steric features of drugs.	Lectures	Oral and written exam
6	1		Optical isomerism and biological activity.	Lectures	Oral and written exam
6	1		Calculated conformation.	Lectures	Oral and written exam
6	1		Three- dimensional quantitative structure activity relationships and databases.	Lectures	Oral and written exam
7	1		Isosterism.	Lectures	Oral and written exam
7	1		Drug-receptor interaction and subsequent events.	Lectures	Oral and written exam
8-14	22		General pathways of drug metabolism: Sites of drug biotransformation; Role of cytochrome P450 mono-oxygenases in oxidative biotransformation;	Lectures	Oral and written exam

			Oxidative reactions; Reductive reactions; Hydrolytic reactions; Phase II reactions.		
15	2		Factors affecting drug metabolism.	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011.
2. Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011.
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Pharmaceutical Chemistry II
4. Modes of Attendance offered	4th Year
5. Semester/Year	1st Semester
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Organic Pharmaceutical Chemistry 2 The study of drug discovery and development and the relationship between chemical composition and effectiveness	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the factors that affect the stability, solubility and absorption of drugs A5- Knowing the mechanism of action of the drug and the relationship of the chemical structure to that A6- Knowledge of the methods used in the preparation of medicines
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquire skill in using different methods in manufacturing and preparing medicines B3- acquiring the skill in how to deal with chemical compounds B4- Gaining the skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1- Knowing the methods of designing drugs and chemical compounds C2- Knowledge of methods of laboratory synthesis of drugs and chemical compounds C3- Learn the methods of laboratory analysis to know the composition of chemical compounds C4- Preparing various medicines
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3-Giving confidence to the student by presenting scientific research
D4- Acquisition of the skill to identify and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3		Cholinergic agents, cholinergic receptors and their subtypes.	Lectures	Oral and written exam
2-3	5		Cholinergic agonists; stereochemistry and structure-activity relationships (SAR); products; cholinesterase inhibitors.	Lectures	Oral and written exam
4-5	7		Cholinergic blocking agent; structure-activity relationships (SAR); Solanaceous alkaloid and analogues; synthetic cholinergic blocking agents and products; ganglionic blocking agents (neuromuscular blocking agents).	Lectures	Oral and written exam
6	3		Analgesic agents (SAR of morphine, SAR of meperidine type molecules; SAR of methadone type compounds; N-methylbezomorphans, antagonist type analgesics in benzomorphans).	Lectures	Oral and written exam
7-8	7		Analgesic receptors, endogenous opioids; Products; Antitusive agents; Antiinflammatory	Lectures	Oral and written exam

			analgesics.		
9-12	11		Adrenergic agents (Adrenergic neurotransmitters); Adrenergic receptors; Drugs affecting Adrenergic neurotransmission; Sympathomimetic agents; Adrenergic receptor antagonists.	Lectures	Oral and written exam
13-15	9		CNS depressant; Benzodiazepines and related compounds; Barbiturates; CNS depressant with skeletal muscle relaxant properties; Antipsycotics; Anticonvulsants.	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
2. Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Pharmaceutical Chemistry III
4. Modes of Attendance offered	4th Year
5. Semester/Year	2ed Semester
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Studying the discovery and development of drugs and the relationship between chemical composition and effectiveness	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .
A1- How to deal with chemical compounds
A2- How to deal with scientific equipment
A3- Learning using different scientific techniques
A4- Knowing the factors that affect the stability, solubility and absorption of drugs
A5- Knowing the mechanism of action of the drug and the relationship of the chemical structure to that
A6- Knowledge of the methods used in the preparation of medicines

B. The skills goals special to the course.
B1 - Acquisition of skill in preparing compounds and medicines
B2 - Acquire skill in using different methods in manufacturing and preparing medicines
B3 - acquiring the skill in how to deal with chemical compounds
B4- Gaining the skill in writing scientific reports

Teaching and Learning Methods

Seminars - daily assignments - written exams

Assessment methods

Oral and written exams-scientific reports

C. Affective and value goals
C1- Knowing the methods of designing drugs and chemical compounds
C2- Knowledge of methods of laboratory synthesis of drugs and chemical compounds
C3- Learn the methods of laboratory analysis to know the composition of chemical compounds
C4- Preparing various medicines

Teaching and Learning Methods

Seminars - daily assignments - written exams

Assessment methods

Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3-Giving confidence to the student by presenting scientific research
D4- Acquisition of the skill to identify and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9		P-Lactam antibiotics (Penicillins); P-Lactamase inhibitors; Cephalosporins and Monobactams.	Lectures	Oral and written exam
4-6	9		Aminoglycosides and Chloramphenicol; Tetracylines; Macrolides; Lincomycins and Polypeptides; Antiviral agents (properties of viruses, viral classification, products).	Lectures	Oral and written exam
7	4		Sulfonamides (chemistry, nomenclature, mechanism of action, resistance, toxicity, side effects, metabolism, protein binding, distribution and SAR); products; Sulfones.	Lectures	Oral and written exam
8-13	17		Anti-neoplastic agents: Alkylating agents; Antimetabolites; Antibiotics; Plant products; Miscellaneous compounds.	Lectures	Oral and written exam
14-15	6		Hormones and related compounds; Future anti-neoplastic agents; Monoclonal antibodies;	Lectures	Oral and written exam

			Gene therapy of cancer.		

11. Infrastructure	
1. Books Required reading:	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
2. Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Organic Pharmaceutical Chemistry IV
4. Modes of Attendance offered	5th Year
5. Semester/Year	1st Semester
6. Number of hours tuition (total)	30 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Organic Pharmaceutical Chemistry 4 Study drug introductions, their properties, preparation and medical uses, and study the use of computers in drug design	

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the factors that affect the stability, solubility and absorption of drugs A5- Knowing the mechanism of action of the drug and the relationship of the chemical structure to that A6- Knowledge of the methods used in the preparation of medicines
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquiring the skill in using different methods in the manufacture and preparation of medicines B3- Acquisition of skill in how to deal with chemical compounds B4- Gaining the skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1- Knowing the methods of designing drugs and chemical compounds C2- Knowledge of methods of laboratory synthesis of drugs and chemical compounds C3 - Learn the methods of laboratory analysis to know the composition of chemical compounds C4- Preparing various medicines
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3-Giving confidence to the student by presenting scientific research
D4- Acquisition of the skill to identify and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6		Basic concepts of prodrugs; Covalent bonds (cleavable); Prodrugs of functional groups; Types of prodrugs.	Lectures	Oral and written exam
4-6	6		Chemical delivery systems; Polymeric prodrugs; Types and structure of polymers; Cross-linking reagents.	Lectures	Oral and written exam
7-8	4		Drug targeting.	Lectures	Oral and written exam
8-9	4		Project.	Lectures	Oral and written exam
10-12	5		Combinatorial chemistry; Peptides and other linear structures; Drug like molecules; Support and linker; Solution-phase combinatorial chemistry.	Lectures	Oral and written exam
12-13	5		Detection, purification and analgesics; Encoding combinatorial libraries; High-throughput screening; Virtual screening; Chemical diversity and library design.	Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
2. Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
It is possible to replace some hours on the topic of Combinatorial Chemistry with the topic of Molecular Modeling due to the importance of the second topic in knowing how to design chemical compounds with pharmacological activities and predict their pharmacological efficacy using advanced electronic programs.

Course Description Form

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Al-Nahrain University
2. University Department/Centre	College of pharmacy/Department of Pharmaceutical chemistry
3. Course title/code	Advanced Pharmaceutical Analysis
4. Modes of Attendance offered	5th Year
5. Semester/Year	2ed Semester
6. Number of hours tuition (total)	45 hours (theoretical and practical)
7. Date of production/revision of this specification	15/11/2022
8. Aims of the Course	
Advanced Pharmaceutical Analysis Study of spectral analysis methods and their use in identifying organic compounds	

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Cognitive goals . A1- How to deal with chemical compounds A2- How to deal with scientific equipment A3- Learning using different scientific techniques A4- Knowing the factors that affect the stability, solubility and absorption of drugs A5- Knowing the mechanism of action of the drug and the relationship of the chemical structure to that A6- Knowledge of the methods used in the preparation of medicines
B. The skills goals special to the course. B1- Acquisition of skill in preparing compounds and medicines B2- Acquisition of skill in using different methods for drug detection B3- Acquisition of skill in how to deal with chemical compounds B4- Gaining the skill in writing scientific reports
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports
C. Affective and value goals C1- Knowing the methods of designing drugs and chemical compounds C2- Knowledge of methods of laboratory synthesis of drugs and chemical compounds C3- Learn the methods of laboratory analysis to know the composition of chemical compounds C4- Preparing various medicines
Teaching and Learning Methods
Seminars - daily assignments - written exams
Assessment methods
Oral and written exams-scientific reports

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1- Conducting scientific experiments
D2- Acquisition of skill in preparing medicines
D3-Giving confidence to the student by presenting scientific research
D4- Acquisition of the skill to identify and classify medicines

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	10		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.	Lectures	Oral and written exam
4-8	14		Infra Red spectroscopy (theory and H-bonding effect; Sampling techniques and interpretation of spectra; Characteristic group frequencies of organic compounds; Application of IR spectroscopy; Problems and solutions.	Lectures	Oral and written exam
9-11	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	Lectures	Oral and written exam

			spin-spin splitting patterns, application of H_1-NMR spectroscopy; C_{13}-NMR spectroscopy: introduction and characteristics, DEPT C_{13}-NMR spectroscopy.		
12-14	9		Mass spectroscopy: Introduction and interpreting Mass spectra; interpreting Mass spectra fragmentation patterns, Mass behavior of some common functional groups.	Lectures	Oral and written exam
				Lectures	Oral and written exam
				Lectures	Oral and written exam
				Lectures	Oral and written exam
				Lectures	Oral and written exam

11. Infrastructure	
1. Books Required reading:	1. Spectrometric Identification of Organic Compounds by Silverstein, Bassler and Morrill; 2. Applications of absorption spectroscopy of organic compounds by Dyer JR. 3. Organic Chemistry by McMurry; 5thed; Thomason learning CA, USA 2000.
2. Main references (sources)	1. Spectrometric Identification of Organic Compounds by Silverstein, Bassler and Morrill; 2. Applications of absorption spectroscopy of organic compounds by Dyer JR. 3. Organic Chemistry by McMurry; 5thed; Thomason learning CA, USA 2000.
A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan
By adding new topics to keep pace with the scientific development taking place