

**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

chemistry department

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.

Academic Program Description Form

University Name: University of Diyala

Faculty/Institute: College of Education for Pure Sciences

Scientific Department: Department of Chemistry

Academic or Professional Program Name: Chemistry

Final Certificate Name: Bachelor of Science in Chemistry

Academic System: Annual

Description Preparation Date: 5/10/2023

File Completion Date: 10/3/2024



Head of Department Name:

.Dr.Abd al-karim Fadhil Ali



Signature:

Scientific AssociateName:

Dr. Khansaa salman farman

The file is checked by:



Department of Quality Assurance and University Performance/ Noor Hassan Hasoon

Director of the Quality Assurance and University Performance Department:



Approval of the Dean

Dr. Ghalib Idris Attia

1. Program Vision

The College of Education for Pure Science always attempts to be one of the promising Higher Education institutions at the University of Diyala, in future education and scientific research through its scientific, research and administrative activity. Moreover, working on supplying useful routes for the students and teachers to make them useful and inventive in society in chemistry science.

2. Program Mission

Work on managing and graduate efficient students with high management and scientific in chemistry, and develop the aptitude in scientific research that brings benefit to society and the country

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized students capable of serving the community and organizing for the preparation of future specializations.
3. Spreading the culture of scientific and cultural diversity in society, transferring scientific knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and departments in different colleges to achieve best practices in the fields of education, learning, and scientific creativity.
5. Focusing on the educational and moral aspects of all college members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.

6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of science, laboratories and research achievements.

7. Focusing on the educational and moral aspects of the student and spreading the spirit of

4. Program Accreditation

No

5. Other external influences

No

6. Program Structure

| Program Structure | Number of Courses | Credit hours | Percentage | Reviews* |
|--------------------------|-------------------|--------------|------------|----------|
| Institution Requirements | 8 | 20 | 10.75 | |
| College Requirements | 11 | 40 | 21.5 | |
| Department Requirements | 24 | 128 | 68.8 | |
| Summer Training | 1 | 4 | 2.15 | |
| Other | | | | |

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

| 7. Program Description | | | | |
|-------------------------|------------------------------|-------------|--------------|-----------|
| Year/Level 2023-2024 | Course Code | Course Name | Credit Hours | |
| | | | theoretical | practical |
| The first stage | Analytical chemistry 1 | CHEM111 | 2 | 2 |
| | organic chemistry1 | CHEM121 | 2 | 2 |
| | Inorganic chemistry1 | CHEM131 | 2 | 0 |
| | Chemical safety and security | CHEM181 | 2 | 0 |
| | Analytical chemistry 2 | CHEM112 | 2 | 2 |
| | organic chemistry2 | CHEM122 | 2 | 2 |
| | Inorganic chemistry2 | CHEM132 | 2 | 0 |
| | biology | BIO120 | 2 | 2 |
| | Educational psychology | EPS120 | 2 | 0 |
| | Foundations of education | EPS101 | 2 | 0 |
| | English | UOA140 | 2 | 0 |
| | Human rights and democracy | UOA135 | 2 | 0 |
| | Arabic | UOA137 | 2 | 0 |
| | Computer Science | UOA141 | 1 | 2 |
| | Calculus 1 | MAT105 | 2 | 0 |
| | Calculus 2 | MAT113 | 2 | 0 |

| Year/Level 2023-2024 | Course Code | Course Name | Credit Hours | |
|-------------------------|----------------------------|-------------|--------------|-----------|
| | | | theoretical | practical |
| the second stage | Analytical chemistry 3 | CHEM213 | 2 | 2 |
| | organic chemistry3 | CHEM223 | 2 | 2 |
| | Inorganic chemistry3 | CHEM233 | 2 | 2 |
| | Physical chemistry1 | CHEM241 | 2 | 2 |
| | Analytical chemistry 4 | CHEM214 | 2 | 2 |
| | organic chemistry4 | CHEM224 | 2 | 2 |
| | Inorganic chemistry4 | CHEM234 | 2 | 2 |
| | Physical chemistry2 | CHEM242 | 2 | 2 |
| | Educational psychology | EPS202 | 2 | 0 |
| | Educational administration | EPS201 | 2 | 0 |
| | Scientific research method | EPS211 | 2 | 0 |
| | English | UOA240 | 2 | 0 |
| | Computer Science | UOA241 | 1 | 2 |
| | mathematics | MAT | 2 | 0 |

| Year/Level 2023-2024 | Course Code | Course Name | Credit Hours | |
|-------------------------|--------------------------------|-------------|--------------|-----------|
| | | | theoretical | practical |
| The Third stage | Analytical chemistry 1 | CHEM351 | 2 | 2 |
| | organic chemistry5 | CHEM325 | 2 | 2 |
| | Inorganic chemistry5 | CHEM331 | 2 | 2 |
| | Physical chemistry3 | CHEM341 | 2 | 2 |
| | Industrial chemistry1 | CHEM361 | 2 | 0 |
| | Biochemistry1 | CHEM352 | 2 | 2 |
| | organic chemistry6 | CHEM326 | 2 | 2 |
| | Inorganic chemistry6 | CHEM332 | 2 | 2 |
| | Physical chemistry4 | CHEM342 | 2 | 2 |
| | Industrial chemistry2 | CHEM362 | 2 | 0 |
| | Teaching curricula and methods | EPS311 | 2 | 0 |
| | Counseling and mental health | EPS312 | 2 | 0 |
| | English3 | UOA340 | 2 | 0 |

| Year/Level 2023-2024 | Course Code | Course Name | Credit Hours | |
|-------------------------|----------------------------------|-------------|--------------|-----------|
| | | | theoretical | practical |
| The Fourth stage | Biochemistry3 | CHEM453 | 2 | 0 |
| | Organic diagnosis1 | CHEM427 | 2 | 2 |
| | Instrumental analysis chemistry1 | CHEM415 | 2 | 2 |
| | Quantum chemistry | CHEM445 | 2 | 0 |
| | Industrial chemistry3 | CHEM463 | 2 | 2 |
| | Biochemistry4 | CHEM454 | 2 | 0 |
| | Organic diagnosis 2 | CHEM428 | 2 | 2 |
| | Instrumental analysis chemistry2 | CHEM416 | 2 | 2 |
| | Quantum chemistry | CHEM446 | 2 | 0 |
| | Industrial chemistry4 | CHEM464 | 2 | 2 |
| | Measurement and evaluation | EPS411 | 2 | 0 |
| | Teaching applications | EPS412 | 2 | 0 |
| | School applications | EPS413 | 0 | 4 |
| | Graduation Project | CHEM491 | 2 | 0 |

| Curriculum skills chart | | | | | | | | | | | | | | | |
|-------------------------|-------------|------------------------------|-------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|
| | | | | Learning outcomes required from the programmer | | | | | | | | | | | |
| Year | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| First Stage | CHEM111 | Analytical chemistry 1 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM121 | organic chemistry1 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM131 | Inorganic chemistry1 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM181 | Chemical safety and security | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM112 | Analytical chemistry 2 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM122 | organic chemistry2 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM132 | Inorganic chemistry2 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | BIO120 | biology | Basic | | √ | √ | | √ | | | | | √ | | |
| | EPS120 | Educational psychology | Basic | | | | √ | | | √ | | | | √ | |
| | EPS101 | Foundations of education | Basic | | | | √ | | | √ | | | | √ | |
| | UOA140 | English | Basic | | √ | | √ | | | | √ | | | √ | |
| | UOA135 | Human rights and democracy | Basic | | | | √ | | | √ | | | | √ | |
| | UOA137 | Arabic | Basic | | | | √ | | | | √ | | | √ | √ |
| | UOA141 | Computer Science | Basic | | √ | | √ | | | | √ | | | | |
| | MAT105 | Calculus 1 | Basic | | √ | √ | | | √ | | | | √ | | √ |
| MAT113 | Calculus 2 | Basic | | √ | √ | | | √ | | | | √ | | | |

| Curriculum skills chart | | | | | | | | | | | | | | | |
|-------------------------|-------------|----------------------------|-------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|
| | | | | Learning outcomes required from the programmer | | | | | | | | | | | |
| Year | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| the second stage | CHEM213 | Analytical chemistry 3 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM223 | organic chemistry3 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM233 | Inorganic chemistry3 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM241 | Physical chemistry1 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM214 | Analytical chemistry 4 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM224 | organic chemistry4 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM234 | Inorganic chemistry4 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | CHEM242 | Physical chemistry2 | Basic | √ | √ | √ | | √ | | | | √ | √ | | |
| | EPS202 | Educational psychology | Basic | | | | √ | | | | | √ | √ | | |
| | EPS201 | Educational administration | Basic | | | | √ | | | | √ | | | | √ |
| | EPS211 | Scientific research method | Basic | | | | √ | | √ | | | | √ | | |
| | UOA240 | English | Basic | | √ | | | | | | | √ | | | √ |
| | UOA241 | Computer Science | Basic | | | | | | | | | | | | |
| | MAT | mathematics | Basic | √ | √ | √ | | √ | √ | | | | √ | | |

| Curriculum skills chart | | | | | | | | | | | | | | | | |
|-------------------------|-------------|--------------------------------|-------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|--|
| | | | | Learning outcomes required from the programmer | | | | | | | | | | | | |
| Year | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | |
| The Third stage | CHEM351 | Analytical chemistry 1 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM325 | organic chemistry5 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM331 | Inorganic chemistry5 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM341 | Physical chemistry3 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM361 | Industrial chemistry1 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM352 | Biochemistry1 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM326 | organic chemistry6 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM332 | Inorganic chemistry6 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM342 | Physical chemistry4 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM362 | Industrial chemistry2 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | EPS311 | Teaching curricula and methods | Basic | | | | √ | | | | √ | √ | | | √ | |
| | EPS312 | Counseling and mental health | Basic | | | | √ | | | | √ | | | | √ | |
| UOA340 | English3 | Basic | | √ | | | | | | | √ | | | | √ | |

| Curriculum skills chart | | | | | | | | | | | | | | | | |
|-------------------------|----------------|---|-------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|---|
| | | | | Learning outcomes required from the programmer | | | | | | | | | | | | |
| Year | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | |
| The Fourth stage | CHEM453 | Biochemistry3 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM427 | Organic diagnosis1 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM415 | Instrumental analysis chemistry1 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM445 | Quantum chemistry | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM463 | Industrial chemistry3 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM454 | Biochemistry4 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM428 | Organic diagnosis 2 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM416 | Instrumental analysis chemistry2 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM446 | Quantum chemistry | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | CHEM464 | Industrial chemistry4 | Basic | √ | √ | √ | | √ | √ | | | √ | √ | | | |
| | EPS411 | Measurement and evaluation | Basic | | | | | | | | | | | | | |
| | EPS412 | Teaching applications | Basic | | | | | | | | √ | √ | | | √ | √ |
| | EPS413 | School applications | Basic | | | | | | | | √ | √ | | | √ | √ |
| | CHEM491 | Graduation Project | Basic | | √ | √ | | √ | | | | | | √ | √ | |

8. Expected learning outcomes of the program

Knowledge

1. The student's knowledge of the electronic structure of atoms
2. Introducing the student to the periodic properties of atoms.
3. Understand the meaning of covalent bonding between atoms.
4. The student's understanding of the nature of ionic compounds in terms of their formation and solubility.
5. Introducing the student to Lewis structures, polyatomic molecules, and molecular geometry.
6. The student knows how to form molecular orbitals.
7. The student's understanding of the topic of hybridization and the theory of equivalence.

Skills

1. That the student masters writing the electronic structure of each atom
2. Distinguish between group and period and the properties of some elements in the periodic table
3. Distinguish between ionic bonding and covalent bonding
4. Teaching the student how to write the Lewis structure for polyatomic molecules
5. Exercise the student on how to draw geometric shapes for covalent molecules

Ethics

1. Preparing qualified cadres to contribute to the comprehensive development and development that Iraq seeks and is witnessing in various fields of chemistry.
- 2- The ability to support the teaching of chemistry in educational institutions, middle and high schools, vocational schools, and various educational and technical institutes.
- 3- The ability to provide consultations in the field of chemistry to various scientific and industrial institutions.
- 4- Contributing to the scientific progress of chemistry through scientific research or participation in local, Arab and international conferences.

9. Teaching and Learning Strategies

1. Application method in research laboratories.
2. Adopting the method of dialogue and constructive purposeful discussion.
3. Adopting the method of trial and error.
4. Adopting multimedia in virtual classes (image, text, audio, video).
5. Adopting interactive lectures via. google meet

10. Evaluation methods

- 1- Weekly written exams.
- 2- Questions during the lecture.
- 3- Quarterly written exams.
- 4- Final written exams.
- 5- Writing scientific reports.
- 6- Quick exams Quiz.
- 7- Homework.
- 8- Committees for discussing graduation projects for final-stage students.

11. Faculty

Faculty Members

| Academic Rank | Specialization | | Special Requirements/Skills (if applicable) | | Number of the teaching staff | |
|------------------------|----------------|---------|---|--|------------------------------|----------|
| | General | Special | | | Staff | Lecturer |
| prof | 8 | | | | 8 | |
| An assistant professor | 10 | | | | 10 | |
| Lecture | 5 | | | | 5 | |
| Assistant Lecture | 0 | 3 | | | 3 | |

Professional development of faculty members

12. Acceptance Criterion

Firstly, the requirements for admission to the college:

1. Approval of admission requirements for students by the regulations of the Ministry of Higher Education and Scientific Research (central admission)
2. To successfully pass any special test or personal interview deemed appropriate by the college or university council.
3. To be medically fit for the specialty applied for.

Secondly, the conditions for admission to the scientific department:

1. Choose the student's desire from more than one desire, arranged according to preference.
2. High school acceptance rate.
3. The course average of the department in which the student wishes to study.
4. Absorptive capacity of the scientific department.

13. The most important sources of information about the program

1. The needs of secondary and middle schools for chemistry majors.
2. Local trends.
3. Industrial and economic trends.
4. Studies and questionnaires.
5. Seminars and specialized workshops with beneficiaries.

Course Description Form

| Week | Hours | Required Learning Outcomes | subject name |
|------|-------|----------------------------------|--|
| 1 | 2 | The electronic structure of atom | General introduction |
| 2 | 2 | The electronic structure of atom | Atomic structure and the origin of quantum theory |
| 3 | 2 | The electronic structure of atom | Electromagnetic radiation, black body radiation |
| 4 | 2 | The electronic structure of atom | Spectrum, atomic spectrum, Bohr atom |
| 5 | 2 | The electronic structure of atom | Quantum numbers and atomic state symbols |
| 6 | 2 | | 1 exam |
| 7 | 2 | Periodic Table | Periodic table, periodic properties of elements |
| 8 | 2 | Periodic Table | Blocking ionization potential |
| 9 | 2 | Periodic Table | Electron affinity, electronegativity |
| 10 | 2 | Periodic Table | The sizes of atoms and ions |
| 11 | 2 | Periodic Table | Radii and types of forces |
| 12 | 2 | | Exam |
| 13 | 2 | Chemical bond | Ionic grid energy |
| 14 | 2 | Chemical bond | Ionic grid energy |
| 15 | 2 | Chemical bond | Crystal lattice structure |
| 16 | 2 | Chemical bond | Lewis structures of polyatomic molecules |
| 17 | 2 | Chemical bond | Ringing |
| 18 | 2 | Chemical bond | Molecular geometry and electronic repulsion method in outer shells |
| 19 | 2 | Chemical bond | Molecular symmetry |
| 20 | 2 | Chemical bond | Molecular orbital formation |
| 21 | 2 | | Exam |
| 22 | 2 | Chemical bond | Diagram of molecular orbital energies for diatomic molecules |
| 23 | 2 | Chemical bond | A diagram of the energy levels of molecular orbitals for triatomic molecules |
| 24 | 2 | Chemical bond | Hybridization |
| 25 | 2 | Chemical bond | How to determine the structure of some simple molecules |
| 26 | 2 | Chemical bond | Chemical bond |
| 27 | 2 | Chemical bond | Common bond or electronic pair bond |
| 28 | 2 | Chemical bond | Common bond properties |
| 29 | 2 | | Exam |
| 30 | 2 | | First-semester review + second-semester review |

1. Course Evaluation

First-semester grade 20%
Second-semester grade: 20%
Final quest score 40%
Final exam score 60%

2. Learning and Teaching Resources

| | |
|--|---|
| Required textbooks | Modern inorganic chemistry for the first stage, part one / Dr. Basem Al-Saadi. Inorganic chemistry, first section / Dr. Noman Al-Nuaimi, Dr. Munther Al-Janabi |
| Main references (sources) | Inorganic Chemistry Principles of Structure and Reactivity, James. E. Huheey. |
| Recommended books and references (scientific journals, reports...) | Basic Inorganic Chemistry, F.A. Cotton, G. Wilkinson and P.L. Gaus, 3rd edition, John Wiley and Sons, Inc. New York, 1995. |
| Electronic References, Websites | Textbook, Concepts & Models of Inorganic Chemistry, 2nd edition, Wiley, New 2009 |

Course Description Form

| 1. Course Name: | | | | | |
|--|---------------|---|---|---|--------------------------|
| Photochemistry | | | | | |
| 2. Course Code: | | | | | |
| | | | | | |
| 3. Semester / Year: | | | | | |
| semester | | | | | |
| 4. Description Preparation Date: | | | | | |
| | | | | | |
| 5. Available Attendance Forms: | | | | | |
| | | | | | |
| 6. Number of Credit Hours (Total) / Number of Units (Total) | | | | | |
| | | | | | |
| 7. Course administrator's name (mention all, if more than one name) | | | | | |
| | | | | | |
| 8. Course Objectives | | | | | |
| Course Objectives | | | | <ul style="list-style-type: none"> • Learn about theories of light interpretation • Identify electronic transfers • Identify ways to lose energy | |
| 9. Teaching and Learning Strategies | | | | | |
| Strategy | | 1- Lectures 2- Means of illustration such as: display screen | | | |
| 10. Course Structure | | | | | |
| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
| 1 | 2 Theoretical | Definition photochemistry Theories interpretation of light | Definition of photoelectric phenomenon Interpretation of the nature of light | lecture | weekly and monthly exams |
| 2 | 2 Theoretical | Light properties | Interpretation the properties light | lecture | weeklyand monthly exams |
| 3 | 2 Theoretical | Basicsoflight | Darber Basics | Lecture | weeklyand |

| | | | | | |
|----|---------------|--|---|---------|-------------------------|
| | | absorption | StarkEinstein Basics | | monthly exams |
| 4 | 2 Theoretical | Laws photochemistry | Beer-Lambert law | Lecture | weeklyand monthly exams |
| 5 | 2 Theoretical | Electronic construction Formation molecular orbitals | Definition of orbital Allotropic orbital antiallergic orbitals, and non-allotropic orbitals | Lecture | weeklyand monthly exams |
| 6 | 2 Theoretical | Transition energies Multiplication | Transitions between electron levels The law multiplicity and knowledge the state of monads and triplets | Lecture | weeklyand monthly exams |
| 7 | 2 Theoretical | The relationship between Electronic transitions and absorption bands | Relate the type transition absorption peaks | Lecture | weeklyand monthly exams |
| 8 | 2 Theoretical | Emission spectrum Spectrum of the binary molecule | Know how the emission spectrum is formed Study the nature of the spectrum the binary molecule | Lecture | weeklyand monthly exams |
| 9 | 2 Theoretical | Absorption spectrum Stimulated emission | Know how the absorption spectrum is formed The effect stimulating energy on emission | Lecture | weeklyand monthly exams |
| 10 | 2 Theoretical | Time of life of irritation | Laws of the age of irritation | Lecture | weeklyand monthly exams |

| | | | | | |
|---|---------------|---|---|---------|-----------------------------|
| | | Non-radiant transference | time Transfers not accompanied by radiation | | |
| 11 | 2 Theoretical | Delayed fluorescence emission Accelerated fluorescence emission Inhibition fluorescence | Slow fluorescence phenomenon Rapid fluorescence phenomenon Inhibition fluorescence phenomenon | lecture | weekly and monthly exams |
| 12 | 2 Theoretical | radiative transition | Transmissions accompanied radiation | Lecture | weekly and monthly exams |
| 13 | 2 Theoretical | The transfer amount Properties of the two transfers π - π^* , n - δ^* | Move quotient laws Study the characteristics of the two transfers and their advantages | Lecture | weekly and monthly exams |
| 14 | 2 Theoretical | Extinction of the irritated particle Through other molecules | Methods quenching molecules Using other molecules | Lecture | weekly and monthly exams |
| 15 | | Exam | Exam | | |
| 11. Course Evaluation | | | | | |
| Daily preparation 20 And daily exams 20 And oral exams 10 And monthly exams 50 | | | | | |
| 12. Learning and Teaching Resources | | | | | |
| Required textbooks (curricular books, if any) | | | Photochemistry\Assistant Profes Dr. Mohi Rasool Hammoud\Baghd 1991 | | |
| Main references (sources) | | | Photochemistry\Assistant Profes Dr. Mohi Rasool Hammoud\Baghd 1991 | | |
| Recommended books and references (scientific journals, reports...) | | | | | |

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|---------------------------------|----------------------------|---|---|--------------|---------------------|
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| Aeo Inbriio i cnnc noicdbiio | Diiodmin ieo ointinnide | sho tehroihh ser ith , sihtrh | , snb cendbinn Aeo icn tinoon | 2 | 2 |
| Aeo Inbriio i cnnc noicdbiio | Diiodmin ieo ointinnide | sih sihtroitit Fro hrutitire | sincdbitio sinin ndb noiticide | 2 | 3 |
| Aeo Inbriio cnnc i noicdbiio | Diiodmin ieo ointinnide | sih sihtroitit Fro hrutitire | noo noiticide | 2 | 4 |
| Aeo Inbriio i cnnc noicdbiio | Diiodmin ieo ointinnide | sih sihtroitit Fro hrutitire | Ceiennn noiticide | 2 | 5 |
| Aeo Inbriio i cnnc noicdbiio | Diiodmin ieo ointinnide | sih sihtroitit Fro hrutitire | rbnna noiticide | 2 | 6 |
| Aeo Inbriio i cnnc noicdbiio | Diiodmin ieo ointinnide | sih sihtroitit | Inoinlio | 2 | 7 |

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|--------------------------------|----------------------------|--|---|----------|-----------|
| | | Fro hrititire | noiticide | | |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | sihiih sihtroitit Fro hrititire | Abirit noiticide Aeo ynoig rntdbn ynoig itcnb | 2 | 8 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | sihiih sihtroitit Fro hrititire | noiticide ldonbe | 2 | 9 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | pnoicideneiR rncwnne Aeo noiticide ndtincI | 2 | 11 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | pnoicideneiR Ten rncwnne Aeo ieoilioiio nelibdegneccen | 2 | 11 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | noiticide Cdemneicio | 2 | 12 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | noiticide ,tigiol | 2 | 13 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | noiticide ,Richidcing | 2 | 14 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Irthit sihiih Fro hrititire | snoice noiticide | 2 | 15 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | Teh hterairt bihiih rs | Aeo icn noiticide ie igRitc DnlnodRgnecc | 2 | 16 |

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|-------------------------------|----------------------------|---|--|----------|-----------|
| | | hrutitire | ntdedgit | | |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | sih nterair Fro hrutitire | Aeo ntRodicide pnndibtnn licibio | 2 | 17 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | sih ltihetisit hrutitire | Aeo noiticide ie cen tibbitioig nnibte | 2 | 18 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | Teh srueritireh mitireitiha ser hrtiit | Ten tdieoiciden Aeo licideioing ndtiio | 2 | 19 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | ie nrutitire ehohphttioh yhtiait | ie noiticide enbnRntciln ynoigit | 2 | 21 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | lhekkit nrutitireit yoir ie | cen nteddo nlnbioo | 2 | 21 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | lhekkit nrutitireit yoir ie | noiticide gncedododmI | 2 | 22 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | lhekkit nrutitireit yoir ie | steddon Dinciemiineno RndRon Attnonbicide | 2 | 23 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | nrutitire eoiaitioh | Ten AttnRc cen ieoilioio nelibdegne Aeo ebigiciln y wdl n edw icnot noiticide | 2 | 24 |
| Aeo lnbrío i cnc noicdbiio | Diiodmin ieo ointinnide | nrutitire Irtiit | y eiln sn in ceic Ten ieoilioio | 2 | 25 |

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| | | | sdtiio enno . Cnbcie | | |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | nrutitire teh rith oii | tieoiem bnoicideneiR CdenincnetI rncwnne Cilioiziciden | 2 | 26 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | nrutitire yhtiait | sIggncbI lnien Aeo tdenincnetI Aeo Teieaiem ie tice weic wdba tn sn oitcienn nib bnoimide | 2 | 27 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | sncciem sdtiio | cen lnien sdtiio tdecdbdo Aeo tdecdbdo ednicilicI | 2 | 28 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | teh tuttuoh ser hrutitire | tn ceic ebitcitnn tice ic binn y nib oitn oibiem ldcenb tnoo nedbc yc cdda i odem cign | 2 | 29 |
| Aeo Inbriio i cnc noicdbiio | Diiodmin ieo ointinnide | nrutitire lrtiit | y eiln sn in ceic Ten ieoilioiio sdtiio enno . Cnbcie | 2 | 31 |

3. Course Objectives

Course Objectives

- 1-Protecting workers in chemical laboratories and chemical stores from health risks and dangers related to the use of chemicals.
- 2-Protecting society and the environment.
- 3- Reducing the possibility of stealing or transferring dangerous and toxic chemicals that could potentially harm others.

4. Teaching and Learning Strategies

Strategy

- Developing learning outcomes in various areas of learning for each of the learning areas shown below
- 1- It provides a quick summary of the knowledge or skills that the course seeks to develop.
 - 2- Description of the teaching strategies used in the course in order to develop that knowledge or skills.
 - 3-The methods used to evaluate the student in the course to evaluate the learning outcomes in this field of study.
 - 4- Evaluation is done through extracurricular activities, written exams, oral exams, and reports, and the lecture method is used in teaching.

5. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|----------------|-----------|--|----------------------|-----------------|-------------------|
| introduction | hour | Introduction to chemical safety and security and national legislation. | | | |
| The first week | Two hours | Safety in laboratories includes: 1- Personal protective equipment 2- Protective tools inside the laboratory, including rubber gloves, goggles, and a laboratory coat. | | | |
| second week | Two hours | General safety precautions in chemical laboratories include: A- Extinguishing fires as soon as they break out. B-Choose the appropriate means of extinguishing, as wood, paper, and clothes are different from oils, grease, and paint, and they are | | | |

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| the third week | Two hours | different from electrical appliances and equipment. | | | |
| fourth week | Two hours | <p>Safety precautions that must be followed when using chemicals include:</p> <ol style="list-style-type: none"> 1- Protective clothing must be worn before using chemicals. 2- Absolutely not smoking, eating or drinking inside the laboratory. 3- The products must be known before starting the reaction in order to avoid any poisoning, ignition, or explosion. | | | |
| The fifth week | Two hours | <p>Material Safety Data Sheets (MSDS): Material Safety Data Sheets are considered a basic reference for chemicals in terms of safety. The sheet is divided into 10 paragraphs.</p> <p>Stability conditions of matter and interactions.</p> <p>Some types of risks in laboratories include: Fire, infection, contact with electrical current, gas leakage, contact with harmful chemicals, contact with hot objects.</p> | | | |
| the sixth week | Two hours | | | | |
| The seventh week | | | | | |
| The eighth week | | | | | |
| The ninth week | | | | | |

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| The tenth week | | <p>Types of injuries in laboratories, where the student learns about: different types of injuries, such as poisoning, dizziness, nausea, allergies, headaches, suffocation, fainting, various wounds, and ways to treat them.</p> <p>First month exam</p> | | | |
| The eleventh week | | <p>Symptoms of exposure to chemicals include redness or itching in the eyes, difficulty breathing, ways to treat them, skin burns, headaches, and nausea. Fires: The student should be familiar with:</p> <ol style="list-style-type: none"> 1- Causes of fires, fire theory, and combustion theory 2-Methods of treating it. <p>Acting when a fire occurs inside the laboratory by doing some of the following:</p> <ol style="list-style-type: none"> 1- Ring the alarm bells, and if there are no alarm bells, raise your voice to alert the fire and ask for help. 2- Make sure everyone leaves the laboratory. 3- Ask someone close to you to contact Civil Defense. 4- Make sure your way out is safe <p>First aid in case of some injuries includes:</p> <ol style="list-style-type: none"> 1. If the eye is exposed to chemicals 2-If the skin is exposed to chemicals 3-If suffocation occurs due to vapors or gases. 4-If chemicals are swallowed. <p>Ways to dispose of chemical waste in a safe manner include:</p> <ol style="list-style-type: none"> 1- Water-soluble chemicals: | | | |
| The twelfth week | | | | | |

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|---------------------|--|-------------------------|--|--|--|
| The thirteenth week | | 2-Solutions of solvents | | | |
| The fourteenth week | | | | | |
| the week Fifteenth | | | | | |

6. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation 5, daily oral 5, monthly 25, or written exams 66, reports 5 etc

7. Learning and Teaching Resources

| | |
|--|---|
| Required textbooks (curricular books, if any) | Curriculum for teaching chemistry safety and security |
| Main references (sources) | |
| Recommended books and references (scientific journals, reports...) | |
| Electronic References, Websites | General Corporation for Technical Vocational Training / Kingdom of Saudi Arabia |

1. sjviCo jbjoesiuoC

Study of the life-giving organic compounds found within the living cell from a structural and functional standpoint.

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A- Cognitive objectives

- 1- Enabling the student to obtain theoretical knowledge of biochemistry
- 2- The student's knowledge of the basic concepts of life-giving organic compounds
- 3- The student's knowledge of the components and composition of carbohydrates, proteins, fats, amino acids, enzymes, and vitamins

B - The skills objectives of the course

- 1- The student is proficient in knowing the chemical structures of living components and their functions in an efficient manner
- 2- Distinguish between nucleic acids and the role of each
- 3- Distinguish between types of fats, their composition and functions
- 4- Study of enzymes, vitamins and hormones-

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- 1- Lectures include dialogue, discussions, and interrogative questions
- 2- Means of illustration, such as: the smart board and display of

educational videos

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1- Oral exams

2-Monthly exams

3- Annual exams

C- Emotional and value goals

1- Adopting the method of dialogue between the student and the professor

2-Preparing organized reports

3- Adopting the discussion method

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

D1- The student's ability to work within the educational and professional work
team

D 2- Positive thinking and utilizing the knowledge he has received

D 3- The ability to deal with parties outside the university and train with them

D 4- That the student is able to learn and master the teaching profession

| 10. vwuXCwxua sauttXuUwauv | | | | | |
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| Weekly and monthly exams | lecture | Introduction to biochemistry | Biochemistry | 2erxuv | 1 |
| Weekly and monthly exams | lecture | Carbohydrates | Carbohydrates | 2 hours | 2 |
| Weekly and monthly exams | lecture | Carbohydrates | Carbohydrates | 2 hours | 3 |
| Weekly and monthly exams | lecture | Carbohydrates | Carbohydrates | 2 hours | 4 |
| Weekly and monthly exams | lecture | Carbohydrates | Carbohydrates | 2 hours | 5 |
| Weekly and monthly exams | lecture | Carbohydrates. | Carbohydrates | 2 hours | 6 |
| Weekly and monthly exams | lecture | Amino acids and peptides | Amino acids and peptides | 2 hours | 7 |
| Weekly and monthly exams | lecture | Amino acids and peptides | Amino acids and peptides | 2 hours | 8 |

| | | | | | |
|---------------------------------|----------------|--------------------------------------|--------------------------------------|----------------|-----------|
| Weekly and monthly exams | lecture | Amino acids and peptides | Amino acids and peptides | 2 hours | 9 |
| Weekly and monthly exams | lecture | Amino acids and peptides | Amino acids and peptides | 2 hours | 10 |
| Weekly and monthly exams | lecture | Proteins | Proteins | 2 hours | 11 |
| Weekly and monthly exams | lecture | T Proteins . | Proteins | 2 hours | 12 |
| Weekly and monthly exams | lecture | lipids | lipids | 2 hours | 13 |
| Weekly and monthly exams | lecture | lipids | lipids | 2 hours | 14 |
| Weekly and monthly exams | lecture | lipids | lipids | 2 hours | 15 |
| Weekly and monthly exams | lecture | lipids | lipids | 2 hours | 16 |
| Weekly and monthly exams | lecture | Nucleotides and nucleic acids | Nucleotides and nucleic acids | 2 hours | 17 |
| Weekly and | lecture | Nucleotides and nucleic acids | Nucleotides and nucleic acids | 2 hours | 18 |

| | | | | | |
|---------------------------------|----------------|-----------------|-----------------|----------------|-----------|
| monthly exams | | | | | |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 19 |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 20 |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 21 |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 22 |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 23 |
| Weekly and monthly exams | lecture | Enzymes | Enzymes | 2 hours | 24 |
| Weekly and monthly exams | lecture | Vitamins | Vitamins | 2 hours | 25 |
| Weekly and monthly exams | lecture | Vitamins | Vitamins | 2 hours | 26 |
| Weekly and monthly exams | lecture | Hormones | Hormones | 2 hours | 27 |

| | | | | | |
|---------------------------------|----------------|-----------------|-----------------|----------------|-----------|
| Weekly and monthly exams | lecture | Hormones | Hormones | 2 hours | 28 |
|---------------------------------|----------------|-----------------|-----------------|----------------|-----------|

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| 11- Course development plan | |
| 1- Required prescribed books | Biochemistry/Dr. Talal Al-Najafi Introduction to biochemistry / Dr. Khawla Al-Flih Biochemistry / Part One / Dr. Tariq |
| 2-)Main references (sources) | |
| A- Recommended books and references)..... ,Scientific journals, bottles(| Physiological biochemistry/Dr. Sami Al-Muzaffar Younis Mahmoud - Dr. Louay Abdul Ali Al-Hilali / Ministry of Higher Education and Scientific Research / University Mosul |
| B- Electronic references, websites | Biochemistry/Lippincott Biochemistry/Harper |

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| 12- Course development plan . |
| Using blended learning to teach theoretical and practical subjects, using computers and electronic applications to explain the subject to students, as well as conducting .electronic exams, including using the Google Classroom application Create a channel on You Tube and upload lectures to it so that they can be a reference for students |