



**توصيف البرنامج  
كيمياء منفرد  
لمرحلة البكالوريوس للعام الأكاديمي  
2023-2024**

## Program specification (Academic year 2023/2024)

### A-Basic information

<b>Program title</b>	B. Sc. in Chemistry
<b>Program type</b>	Single
<b>Department</b>	Chemistry
<b>Coordinator</b>	<b>Dr. Ali Hassan Mohamed</b>
<b>External evaluator</b>	
<b>Last date of program specification approval:</b>	9/ 2023

### B-Professional information

This program aims to

1. Recognize the role of basic science that meets community needs.
2. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to interpret in the field of Chemistry.
3. Develop graduates with the skills of data collection, interpretation and presentation data in English and Arabic.
4. Demonstrate wide background knowledge related to the different branches of chemistry.
5. Collect, analyze, and present theoretical and practical data by using appropriate formats, scientific facts, theories and techniques.
6. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
7. Apply information technology relevant to the field of chemistry.
8. Participate in quality control processes, manage risks, work in a teamwork, decision making and organize time to finish jobs.
9. Conduct experimental work, evaluating the outcomes, and reporting data on practice.
10. Participate in research activities and representing working with relevant and advanced laboratory techniques.

## 2- Intended learning outcomes of Program (ILOs)

### A- Knowledge and understanding:

By the end of this program the graduate should be able to:

A.1. Mention the basic concepts of algebra, statistics, integration, differentiation, geometry, matter, light, waves, heat, crystal, radiation, animals' systems, plant taxonomy, crystals, minerals, soil.

A.2 Sequence the terminology of computer science technology, principle of English languages and their help in science and environment.

A.3. Outline the role of environment culture, management, human right and anti-corruption, and philosophy of science in life.

A.4. Describe the basics concepts of physical chemistry, thermodynamics laws, the principals of phase diagrams for different systems, the electronic structures of atoms, different classes of organic compound and Mono and bi-function groups, and the classification of Micro- and macromolecules of carbohydrates, reactions and structure of saccharides, chemistry, classification of protein and synthesis of peptide, and lipids.

A.5. Mention the chemical equilibrium, redox reactions, the different pH titration curves, hydrolysis of salts, Colloidal properties, buffer system, analytical tools and important terms in analytical chemistry.

A.6. Describe chemical bonding, inductive effect, resonance effect, Acid-Base theories and chemical structure of polynuclear compounds.

A.7. Describe the information about, the difference between the classical and quantum mechanics, the black body radiation, the photoelectric effect and the dual nature of matter, physical and chemical properties of s and p block elements.

A.8. Define the electrolytic dissociation, the conductivity measurement, electrolyte, the transference of ions and the salvation of ions.

A.9. Mention the basic concepts of the field of X-ray diffraction and crystal structure, with focusing on state-of-the-art X-ray diffraction systems.

A.10. Describe stereochemical relationships (enantiomers, diastereomers, epimers, etc), physical and chemical properties of Mono, and bi- functional group compounds.

A.11. Describe the quantum numbers sources, the harmonic and anharmonic oscillator, the rigid rotor in quantum mechanics, the tunnelling in classical and quantum mechanics, precyclic photochemistry, the different electromagnetic regions, components of UV-Vis instrument, Beer's-Lambert law, different chromatographic and instrumental techniques for analysis.

A.12. Define electrode, electrolyte, overpotential, escaping tendency, colligative properties, factor affecting reversible and irreversible cells, types of thermodynamics parameters of

solution and battery (reversible and irreversible), the rate of reaction, different chemical rate of reaction and the factor affecting on the reaction rate.

A.13. Describe the basic concept of transition elements, different important complexes of the transition metals and coordination chemistry, heterocyclic compounds, synthesis and reactivity, physical organic chemistry including types of reactions and reaction mechanism, polymer molecules, different types of polymer structures, polymerization process, copolymerization process and different methods for the determination of polymer molecular weight.

A.14. Recognize the IR, laser, microwave, NMR and Raman spectroscopy.

A.15. Define the lanthanides, actinides, characteristic properties of f-block elements, crystal field, molecular orbital theories and their application to problems, the principles of a systems approach to electro-analytical concepts, and the principal of orbital symmetry and pericyclic reactions.

A.16. Describe the sources, methods of extraction and techniques that used for identification of natural products, organic compounds by using spectroscopic tools.

A.17. Mention the importance of automated analysis compared to manual instrumental methods of analysis, the information about the thermal gravimetric analysis, its types, instrumentations, kinetic methods of analysis for catalytic and non-catalytic reactions, the corrosion process, different types of corrosion, factors affecting the corrosion process and methods of the corrosion control, and the kinetics of chemical reactions.

A.18. Describe organometallic compounds and their classification, biochemical processes, dissociation of bio ligands and complex formation, the different types of petrochemicals such as crude oil and natural gas, the different types of colloidal systems, the phase rule, different types of phase diagrams, factor affecting the properties metal alloys and composites, the energy sources, different types of energy sources and cells used in energy conversion.

A.19. Mention the various application technique commonly used in the physical laboratory for calculating the numerical value for  $K_{eq}$  starting from partition coefficient  $K_c$ , the polymerization equation rate, different types of polymerization techniques, factor affecting the molecular weight of polymers and the industrial applications of organic polymers.

A.20. Describe the most common steps used in preparation of nanomaterial, the sources of every type of pollutions and the means of removing or treating the polluted media, and the preparation techniques of samples for real chemical analysis and theories dealing with the methodology to prevent the interference.

A.21. Describe the difference between the homogenous and heterogenous catalysis, the substitution reactions of square platinum complexes and charge transfer concept, chemical structure of various dyes, and different types of buffer solution.

## **B- Intellectual skills**

By the end of this program the graduate should be able to:

B.1. demonstrate the different theory and postulate in geometry, integration, algebra, statistics and differentiation.

B.2. Classified the different animals systems, plant taxonomy, crystals, minerals, soil and the different of properties between matter, light, waves, heat, crystal and radiation related basic science.

B.3. Mention on the role of computer, English languages, environment culture, management, human right, and philosophy terminology in science and environment.

B.4. differentiate between the different properties of matter types, phase systems, the mathematics equations of zero, 1st, 2nd and 3rd laws of thermodynamics, the types of reactions as being oxidation or reduction, common and IUPAC names of different classes of organic compound, different pH titration curves, and different types of polynuclear compounds, and different types of nucleophilic substitution reactions.

B.5. Illustrate black body radiation, the photoelectric effect and the postulates of quantum chemistry, the characteristic X-ray, type of unit cells, mechanisms used in preparation of organic compound.

B.6. Discuss how to differentiate between different types of s and p block elements, the electrolytic data, chiral compounds containing one or more chiral carbon atoms, essential and nonessential fatty acids, and the importance of sex hormones.

B.7. Deduce the mechanism and order of organic and inorganic reaction.

B.8. Compare between reversible and irreversible cell, the different electromagnetic regions IR, UV, H-NMR and the effect of every region on the atoms and molecules and also between the different chromatographic techniques and instruments used for analysis.

B.9. Demonstrate the rules for electronic distribution of transition metals, physical and chemical properties of transition metals, coordination number of transition elements and name and formula of ligands, the mechanism of substitution reactions, addition, nucleophilic and elimination reactions, the different types of molecular spectroscopy.

B.10. Distinguish between the different types of polymers initiators, and different types of buffer solution.

B.11. Suggest methods for pericyclic reactions, electrocyclic reactions, the general methods of structure elucidation of natural compounds.

B.12. Calculate the  $\nu$  in IR using Hooke's law and  $\lambda$  max using Fieser-Woodward method in the UV spectra of organic molecules.

B.13. Differentiate between types and forms of corrosion, different types of energy, cells used as a source of energy, different types of adsorptions and factors affecting adsorption by kinetics of adsorption, the different types of manual and automated instrumental methods of analysis, chain and stepwise mechanism of polymerization, crude oil and natural gas.

B.14. Illustrate analytical application of TGA, DSC, DTA, differential Logarithmic

extrapolation and proportional- equation the methods of analysis for the determination of mixture species, the different mechanisms of organic and inorganic reactions.

B.15. Discuss the application of organometallic compounds in organic chemistry, the applications of colloidal systems in industry.

B.16. Discuss the structure and morphology of nanomaterials, and the method of preparation of bioplastic.

B.17. Classify the molecules according the point groups and use their character tables to know the symmetry operations, and the ways to increase the rate of reactions occurring in surface of metals, solid state materials.

B.18. Illustrate the global economic losses resulting from pollution problems, and the adverse effects of interferences from which each instrument suffers for chemical analysis.

B.19. Differentiate between quadrilateral symmetric and hexagonal symmetric complexes, different methods for synthesis of dyes.

### **C- Professional and practical skills**

By the end of this program the graduate should be able to:

C.1. Use the basic information of calculus, algebra, statistics, geometry, physical laws, different types of motions in other disciplines.

C.2. categorize the principle of computer program, software, management, human right and anti-corruption, English language, and philosophy of science, in solving environmental problems.

C.3. Illustrate the complexity of tissues, morphology of plants, animal and insects organs, crystal systems, crystal classes and the different crystal forms using light microscope.

C.4. Examine Schrödinger equation for different systems and get the spectra (Eigen values), the electronic structures of some compounds and their oxidation state for every atom, the conductivity for different electrolyte, factors affecting on different types of nucleophilic substitution reactions.

C.5. Evaluate the Grin size, lattice parameters and other structural properties, chemical and physical properties, atomic numbers, electronic configuration into metals, nonmetals, semimetals, Nobel elements, and new methods for separation of an optically active compounds.

C.6. Conduct of standard laboratory procedures for practice skills of accuracy to investigate the chemical structure of unknown organic compounds, protein and amino acids in prepare lab report.

C.7. Solve the problems using particle in a ring as a model for cyclization of compounds, the electrode potential and EMF of electrochemical cell, and the reaction ordered.

C.8. Apply the rules, naming coordinated compounds for naming different ligands and complexes, model the mechanism of some chemical reactions, obtained spectra together to identify the structure of compounds.

C.9. Compute the different scheme for synthesis and reactions of hetero cyclic compounds, different types of buffer, and Interpret the affecting of polymerization conditions on polymers structures and properties.

C.10. Apply different methods for molecular weight determination of polymer, suitable method and tools to prepare and analyze complexes, the extraction techniques in isolation of natural products, and investigate the diagrams of an electrocyclic reaction and pericyclic reactions.

C.11. Use spectroscopic techniques to know the structure of un known chemical compounds from chemical analysis charts e.g: UV- IR, H-NMR and Mass.

C.12. Use chemical tools to measure both partition coefficient  $K_c$  and equilibrium constant  $K_{eq}$ .

C.13. Use gaussian program for calculating thermodynamics parameters using ab initio and DFT methods).

C.14. Apply new research idea in various research topics such as natural products, polymer chemistry and water treatment.

C.15. Apply the schemes for applications of materials, the phase rule for two and three components system practically.

C.16. Report the environmental problems in Egypt and the Globe.

C.17. Implement chemical investigation to know the structure of dyes as common industrial effective compounds, and the application of organometallic to catalyst, different energy transformation.

#### **D- General and transferable skills**

By the end of studying the program, the graduate should be able to:

D.1. Accepts supervision and direction learn with others to simple verbal or written communication.

D.2. Learn how to search for information using the library or internet resources, working in a group, and make a short report in a written form and orally using appropriate scientific language.

D.3. Think independently, set tasks and solve problems on scientific basis.

D.4. Provide the students with the skills of self-learning through communicate with students via e-mails or websites to save time.

D.5. manage time, collaborate and communicate with others positively.

D.6. Encourage students to think critically and involve in discussions with the instructor in class room.

D. 7. Apply scientific models, systems and tools effectively.

D.8. Learn how to search for information using the library or Use of technological tools.

D.9. Acquire self- and long life–learning.

### **3- Academic standards**

**National Academic Reference Standards (NARS)** for single programs of Basic Sciences that prepared by the National Authority for Quality Assurance and Accreditation of Education (NAQAAE) in January 2009 (1<sup>st</sup> edition):

#### **General Attributes of the Graduates of Basic Sciences**

##### **The graduates must be able to:**

1.1.1. Recognize the role of Basic Sciences in the development of society.

1.1.2. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.

1.1.3. Utilize scientific facts and theories to analyze and interpret practical data.

1.1.4. Collect, analyze, and present data using appropriate formats and techniques.

1.1.5. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

1.1.6. Apply effectively information technology relevant to the field.

1.1.7. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

1.1.8. Adopt self and long life-learning and participate effectively in research activities.

1.1.9. Deal with scientific data in Arabic, English or other languages.

4.1.1. Design and conduct experimental work, critically evaluate the outcomes, review and report on practice.

4.1.2. Have knowledge and experience of working with relevant and advanced laboratory techniques.

4.1.3. Participate in and review quality control processes, manage risks and organize time to finish jobs.

4.1.4. Demonstrate wide background knowledge related to the different branches of



chemistry.

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

1.2.1. The related basic scientific facts, concepts, principles and techniques.

1.2.2. The relevant theories and their applications.

1.2.3. The processes and mechanisms supporting the structure and function of the specific topics.

1.2.4 The related terminology, nomenclature and classification systems.

1.2.5. The theories and methods applied for interpreting and analyzing data related to discipline.

1.2.6. The developmental progress of the program-related knowledge.

1.2.7. The relation between the studied topics and the environment.

4.2.1. Chemical concepts, nomenclature, formulae and units.

4.2.2. Characteristics of the different states of the matter and elements including trends within the periodic table and the related theories.

4.2.3. The principles, procedures and techniques used in chemical analysis, characterization and structural investigations of different chemical compounds.

4.2.4. The major types of chemical reactions, their characteristics and mechanisms as well as their kinetics including catalysis.

4.2.5. The principles of thermodynamics and quantum mechanics including their applications in chemistry.

4.2.6. The constitution and properties of the different chemical compounds, including the main synthetic pathways and the relation between the properties of individual atoms and molecules.

4.2.7. The current issues of chemical research and technological development.

### **B. Intellectual Skills**

1.4.1. Differentiate between subject-related theories and assess their concepts and principles.

1.4.2. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.

1.4.3. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.

1.4.4. Postulate and deduce mechanisms and procedures to handle scientific problems.

1.4.5. Construct several related and integrated information to confirm, make evidence and test hypotheses.

4.4.1. Differentiate between the different states of the matter, elements and compounds based

on the recognition and quantification of the properties.

4.4.2. Employ computational software's and dataprocessing skills in handling of chemical information and analysis of chemical data.

4.4.3. Explain concepts and determine the efficiency of chemical systems by applying mathematical expressions.

4.4.4. Analyze chemical data to identify and confirm chemical structures as well as determine chemical composition.

4.4.5. Propose and conclude mechanisms for physical and chemical processes.

### **C. Practical and Professional Skills**

1.3.1. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.

1.3.2. Apply techniques and tools considering scientific ethics.

1.3.3. Solve problems using a range of formats and approaches.

1.3.4. Identify and criticize the different methods used in addressing subject related issues.

4.3.1. Assess risk in laboratory work taking into consideration the specific hazards associated with the use of chemical materials as well as the safe and proper operation of the laboratory techniques.

4.3.2. Conduct standard laboratory procedures involved in analytical and synthetic work.

4.3.3. Monitor by observation and measurements the chemical properties or changes, including systematic recording and technical reporting.

4.3.4. Use computational packages and tools in chemical investigations.

### **D. General and Transferable Skills**

1.5.1. Use information and communication technology effectively.

1.5.2. Identify roles and responsibilities, and their performing manner.

1.5.3. Think independently, set tasks and solve problems on scientific basis.

1.5.4. Work in groups effectively; manage time, collaborate and communicate with others positively.

1.5.5. Consider community linked problems, ethics and traditions.

1.5.6. Acquire self- and long life-learning.

1.5.7. Apply scientific models, systems, and tools effectively.

1.5.8. Deal with scientific patents considering property right.

1.5.9. Exhibit the sense of beauty and neatness.

**4- External references for standard (Benchmark):**

N/A

**5-Curriculum Structure and Contents**

Area	NAQAAE		Chemistry program	
	Percentage	Tolerance	Percentage	Hours
Humanities	6	5-7	6	8
Computer science	6	5-7	6	8
Basic science	28	27-29	26	36
Specialty	50	48-52	60	82
Research and Graduation Project	2	1-3	2	2
Others (Discretionary)	8	7-9	-	-

**5.1 Humanities requested Courses:**

No. of credit hours of humanities requested Courses (8) credit hours:

**a- Compulsory**

Level No.	Code No.	Course Title	No. of hours /week		
			Lecture	Practical	Total hrs
1	1001-001	English language	1	-	2
1	1002-004	Scientific thinking and writing	1	-	2

**b- Selective**

Level No.	Code No.	Course Title	No. of hours /week		
			Lecture	Practical	Total hrs
1	1001-002	مبادئ الإدارة	1	-	2
1	1001-003	Environmental Culture	1	-	2
1	1002-005	تاريخ العلوم	1	-	2
1	1002-006	Human rights and anti-corruption	1	-	2

## 5.2. Computer science requested Courses:

No. of credit hours of computer science requested Courses (8) credit hours:

### a. Compulsory

Level No.	Code No.	Course Title	No. of hours /week			
			Lecture	Practical	training	Total hrs
1	3121-001	Introduction to computer science	1	2	-	2
1	3122-002	Fundamentals of Programming	1	2	-	2
2	3123-003	Data Analysis and Presentation	1	2	-	2
2	3124-004	Web Development	2	-	1	2

### b. Selective

---

## 5.3 Basic science requested Courses:

No. of credit hours of basic science requested Courses (36) credit hours:

### a. Compulsory

Level No.	Code No.	Course Title	No. of hours /week			
			Lecture	Practical	training	Total hrs
1	2201-001	Inorganic 1& Physical chemistry 1	2	2	-	3
1	2301-001	General physics 1	2	2	-	3
1	2111-005	Calculus and Analytical Geometry (1)	2	2	-	3
1	2502-001	Physiology & Histology	2	2	-	3
1	2402-001	General Botany	2	2	-	3
1	2602-001	General geology 1	2	2	-	3
2	2303-002	General physics 2	1	2	-	2
2	2113-008	Calculus (2)	2	-	1	2
2	2304-002	Principles of systematic and microbiology	1	2	-	2
2	2304-003	General physics 3	2	-	-	2
2	2113-014	Advanced Calculus	2	-	1	2
2	2504-002	Invertebrate & Vertebrate	2	1	-	2
3	2605-002	General geology 2	1	2	-	2
3	4115-141	Ordinary Differential Equations	2	-	1	2
3	4136-143	Applied statistics	2	-	1	2

**b. Selective****5.4. Specialization requirements**

No. of credit hours of specialized courses (84) credit hours:

**a. Compulsory**

Level No.	Code No.	Course Title	No. of hours /week			
			Lecture	Practical	training	Total hrs
1	2201-002	Organic chemistry(1) and Biochemistry	2	1	-	2
1	2202-003	Analytical & Physical chemistry 2	2	1	-	2
2	4243-004	Mon- and Bi-functional groups	2	1	-	2
2	4213-005	Chemistry of electrolytic solutions	2	1	-	2
2	4223-006	Inorganic Chemistry 2	1	2	-	2
2	4224-009	Chemistry of Main Group Elements	1	2	-	2
2	4244-010	Physical organic chemistry	1	2	-	2
2	4244-011	Chemistry of Aromatic Compounds	1	2	-	2
3	4215-015	Kinetics of chemical reactions	1	2	-	2
3	4215-016	Thermodynamic chemistry	1	2	-	2
3	4215-017	Quantum chemistry (1)	2	-	1	2
3	4225-018	Chemistry of Transition Metals 1 and coordination chemistry	2	-	-	2
3	4235-019	Electrochemical Cells	1	2	-	2
3	4246-023	Natural polymer Chemistry	1	2	-	2
3	4216-024	Quantum chemistry 2	2	-	1	2
3	4226-025	Chemistry of Transition Metals 2	1	2	-	2
3	4236-026	Analyze using devices	1	2	-	2
3	4246-027	chemistry of Polynuclear Hydrocarbons	1	2	-	2
4	4207-031	Graduation Project	1	-	2	2
4	4217-032	Chemistry of physical polymers	1	2	-	2
4	4217-033	Molecular Structure and Molecular Spectroscopy	2	-	1	2
4	4247-034	Stereochemistry	1	2	-	2
4	4217-035	organic reaction mechanism	1	2	-	2
4	4237-036	Advanced Electroanalytical Chemistry	1	2	-	2
4	4247-037	Heterocyclic organic chemistry	1	2	-	2

4	4218-041	Catalysis and surface chemistry	1	2	-	2
4	4218-042	Chemistry of colloidal solutions	1	2	-	2
4	4218-043	Corrosion chemistry and double layer	1	2	-	2
4	4248-044	Natural products chemistry	1	2	-	2
4	4248-045	Applied molecular spectroscopy	1	2	-	2
4	4248-046	Precyclic and photo chemistry	1	2	-	2

#### b. Selective

Level No.	Code No.	Course Title	No. of hours /week			
			Lecture	Practical	training	Total hrs
2	4233-007	Principles of qualitative and quantitative analysis	1	2	-	2
2	4213-008	Energy conversion	1	2	-	2
2	4234-012	Buffer solutions	2	-	-	2
2	4214-013	Phase rule	1	2	-	2
2	4244-014	Chemistry of dyes	2	-	-	2
3	4215-020	Inorganic reaction mechanism	2	-	-	2
3	4245-021	Organometallic Chemistry	1	2	-	2
3	4215-022	Applied chemistry	1	2	-	2
3	4216-028	Solid state chemistry	2	-	-	2
3	4216-029	symmetry in chemistry	2	-	-	2
3	4246-030	Petroleum Chemistry	1	2	-	2
4	4217-038	Principles of nanotechnology	1	2	-	2
4	4237-039	chemical pollution	2	-	-	2
4	4217-040	Thermal analysis methods	2	-	1	2
4	4218-047	Advanced physical polymers	2	-	-	2
4	4238-048	Chromatographic analysis	1	2	-	2
4	4228-049	Bioinorganic Chemistry	2	-	-	2

#### 5.4. Summer training:

The students of chemistry program should spend 21 days of training in institutions, companies or factories related to the field of interest. This training is held during the summer break between the third and fourth academic years.

#### 6- Program admission requirement:

**Registration** to the Faculty of Science requires the student to have the General Egyptian Secondary Education in Science Group Certificate or equivalent certificates or degrees approved by the Egyptian ministry of higher education with qualifying grades according to the guidelines put annually by the Ministry of higher education.

## 7-Regulations for progression and Program completion

- Students must attend at least **75%** of practical sessions. Students who fail to meet this minimal percent of attendance may be prevented from attending exam in this specific course based on department council recommendation and decision of faculty council. The grade awarded for this course is “failed” unless student presents an excuse for absence that is accepted by faculty council in which case he is considered absent with acceptable cause. Student may attend exam of the course or may defer taking the exam till reset. These exams usually held in September.
- To progress to a higher year, students must pass in all courses.
- Students who fail in two courses maximum are entitled to a make-up exam held in September before the beginning of the scholastic year.
- Students who fail in more than two courses are not entitled to the make-up exam and have to repeat the year and retake the exams in the failed courses.
- The total grade for students who attempt the make-up exam includes grades for written exam, practical exams but not the grades for continuous assessment. The total grade for such courses is recalculated based on the original total grade for the course.
  - For students who present an acceptable excuse for absence in the final exam, the grades for continuous assessment are included within the total after the make-up exam.
  - Students who fail in the makeup exam or do not attend it should repeat the year.
  - Students after the third year must achieve a non-scored threshold field-training summer course based on submission of a formal written non-scored report and a scientific seminar graded pass from the training institution and the faculty supervisor members with a minimum attendance of 75% of the training period. Students who fail the summer training course will not be able to obtain the completion degree certificate of the program.
  - The final written exam duration is two or three hours for each course.
  - In order that a student passes in a course, his/ her grades should be above the percent for passing provided that he/ she at least get 30% of the grades for the final written exam.
  - For students who get less than 30% of the grade for the final written exam, no grades are recorded in that course, and he/she is considered “failed” that course with a grade “very weak”.
- Students are graded as follows:

<b>Excellent</b> $\geq$ 85%	<b>Very good</b> $\geq$ 75% - less than 85%
<b>Good</b> $\geq$ 65% - less than 75%	<b>Fair</b> $\geq$ 60% - less than 65%

**Weak**  $\geq 35\%$  - less than 60%

**Very weak** less than 30%

### 8 – Assessment of program intended learning outcomes.

Tool or method	ILOs
Written	Knowledge and understanding and Intellectual skills
Practical	Practical and professional skills
Mid-term	Knowledge and understanding and Intellectual skills
Student Activity	General and transferable skills
Others	

#### 8.2-Assessment schedules/semester

Method	Week(s)
Mid-term exam	6 <sup>th</sup>
Oral exam	13 <sup>th</sup>
Practical exams	15 <sup>th</sup>
Final exams	managed by administrations (in the last two weeks of semester)

#### 8.3-Weight of assessments

Assessment	% practical and theoretical courses	% theoretical courses
Mid-term exam	5	15
Practical exercises	5	15
Oral exam	10	10
Practical exams	20	--
Final exams	60	60
<b>Total</b>	<b>100%</b>	<b>100%</b>

### 9-Methods of program evaluation:

Evaluator	Tool	Samples
1- Senior Students	Questionnaires and open discussion	50%
2- Alumni	Meeting and Questionnaires	50%
3- Stakeholders (Employers)	Meeting and Questionnaires	Approximate sample
4- External Evaluators	Test reviews	All participants in the programmer
Other (External examiners)	Personal interview	All participants in the programmer

**Program coordinator**

**Head of chemistry departenemt**

**Dr. Ali Hassan Mohamed**

**Prof. Dr. Hanafy M. Abd el-salam**