

1.	School	Science
2.	Department	Chemistry
3.	Program title (Arabic)	البكالوريوس في الكيمياء
4.	Program title (English)	B.Sc. in Chemistry

5. Components of Curriculum:

The curriculum for the bachelor's degree in chemistry consists of (132) credit hours distributed as follows

Number	Type of requirement	credit hours
First	University Requirements	27
Second	Faculty Requirements	21
Third	Specialization Requirements	84
Total		132

6. Numbering System:

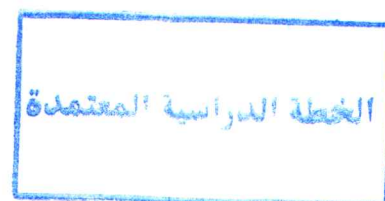
A- Department number

Number	Department
1	Mathematics
2	Physics
3	Chemistry
4	Biological Sciences
5	Geology
8	Clinical Sciences



QF-AQAC-02.03.1.2

Study Plan- Bachelors



B- Course number

Domain number	Domain title	Domain number	Domain title
0	General Chemistry	5	Industrial Chemistry
1	Analytical Chemistry	6	Software Packages
2	Inorganic Chemistry	7	
3	Organic Chemistry	8	
4	Physical Chemistry	9	Seminar

C- Course number consists of 7 digits

School		Department		Level	Field	Sequence
0	3	0	3	2	0	1

الخطة الدراسية المعتمدة

First: University Requirements:

Preparation Program Requirements (0 - 15 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Basics of Arabic	3201099	3		Pass/Fail
2	Arabic Languages Skills	3201100	3	3201099	Pass/Fail
3	Basics of English	3202099	3		Pass/Fail
4	English Language Skills	3202100	3	3202099	Pass/Fail
5	Basics of Computing	1932099	3		Pass/Fail

Compulsory Requirements (18 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military Science	2200100	3		
2	National Culture	3400100	3		
3	Learning & Research Skills	3400101	3	3202099	
				3201099	
				1932099	
4	Communication Skills	3400102	3	3400101	
5	Introduction to Philosophy and Critical Thinking	3400103	3	3400101	
6	Human Civilization	3400104	3		
7	Campus Life and Ethics	3400105	(Zero credit; one-hour weekly meeting)		

الخطة الدراسية المعتمدة

Electives

(9 Credit Hours)

(3 Credit hours From Each Group)

(First Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Great Books	3400107	3		
2	Islam and Current Issues	0400101	3		
3	Arab-Islamic Civilization	2300101	3		
4	Jordan: History and Civilization	2300102	3		
5	Jerusalem	3400108	3		

Electives

(Second Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Legal Culture	1000102	3		
2	Environmental Culture	0300102	3		
3	Physical Fitness Culture	1100100	3		
4	Islamic Culture	0400102	3		
5	Health Culture	0720100	3		

Electives

(Third Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Entrepreneurship & Creativity	3400109	3		
2	Foreign Language	2200103	3		
3	Electronic Commerce	1600100	3		
4	Social Media	1900101	3		
5	Appreciation of Arts	2000100	3		
6	Special Subject	3400106	3		

Second: all students must do exams in Arabic, English and computer skills, students who fail in these exams should study and pass (099) course additional to curriculum.

Third: School courses: distributed as follows:

A. Obligatory school courses: (21) credit hours

B. Elective school courses: (0) credit hours

A. Obligatory school courses: (21) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus-1	3		3	-
0302101	General Physics-1	3		3	-
0303101	General Chemistry-1	3		3	High School Chemistry or 0303099
0304101	General Biology-1	3		3	-
0305101	General Geology	3		3	-
0301131	Principles of Statistics	3		3	-
1931102	Computer Skills for Scientific Faculties	3		3	1902098 or 1932099

B. Elective school courses: (0) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		

Fourth: Specialty courses: (84) credit hours distributed as follows:

B. Obligatory specialty courses: (69) credit hours

C. Elective specialty courses: (15) credit hours

الخطة الدراسية المعتمدة

A. Obligatory specialty courses: (69) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301102	Calculus 2	3		3	0301101
0302102	General Physics 2	3		3	0302101
0302112	Physics Laboratory 2		3	1	0302102 or Concurrently
0301221	Normal Differential Equations 1	3		3	0301102
0303102	General Chemistry 2	3		3	0303101
0303106	Experimental General Chemistry for Chemistry Students	1	3	2	0303102 or Concurrently
0333211	Analytical Chemistry	3		3	0303102
0303216	Experimental Analytical Chemistry		3	1	(0333211 or Concurrently) + 0303106
0303221	Inorganic Chemistry 1	3		3	0303102
0303231	Organic Chemistry 1	3		3	0303102
0303232	Organic Chemistry 2	3		3	0303231
0303236	Experimental Organic Chemistry 1	1	4	2	0303106 + 0303231
0303241	Physical Chemistry 1	3		3	0303102 + 0301102
0303246	Experimental Physical Chemistry 1	1	3	2	0303106 + 0303241
0343311	Instrumental Analysis	3		3	0333211
0333312	Electroanalytical Chemistry	3		3	0343311
0303316	Experimental Instrumental Analysis		3	1	(0343311 or Concurrently) + 0303216
0303321	Inorganic Chemistry 2	3		3	0303221
0303322	Inorganic Chemistry 3	3		3	0303321
0303326	Experimental Inorganic Chemistry	1	5	3	0303106 + 0303321
0303331	Organic Chemistry 3	3		3	0303232
0333336	Systematic Identification of Organic Compounds	1	5	3	0303232+0303236
0303341	Physical Chemistry 2	3		3	0303241
0303342	Physical Chemistry 3	3		3	0301221+0303341
0303346	Experimental Physical Chemistry 2	1	3	2	0303246 + 0303341
0303351	Industrial Chemistry 1	3		3	0303241
0333391	Search of Chemical Literature	1		1	Chemistry Department

					Consent
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B. Elective specialty courses: (15) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0333323	Nuclear and Radiochemistry	3		3	0303102
0333361	Software Packages in Chemistry	1	3	2	0303341
0353411	Special Topics in Analytical Chemistry	3		3	0333312
0333412	Environmental Analytical Chemistry	3		3	0343311
0343421	Organometallic Chemistry	3		3	0303321
0353422	Special Topics in Inorganic Chemistry	3		3	0303322
0353431	Special Topics in Organic Chemistry	3		3	0303331
0353432	Introduction to Heterocyclic Chemistry	3		3	0303331
0333436	Advanced Preparation of Organic Compounds (practical)		6	3	0333336
0333441	Advanced Physical Chemistry	3		3	0303342
0333442	Colloid and Surface Chemistry	3		3	0303341
0333451	Industrial Chemistry-2	3		3	0303341
0303452	Polymer Chemistry	3		3	0303232
0303453	Materials Chemistry	3		3	0303341
0303496	Experimental Chemical Research		4	1	0343391 + Chemistry Department Consent
0333433	Bioorganic Chemistry	3		3	0303331
0344321	Biochemistry	3	3	4	0303232

الخطة الدراسية المعتمدة

Fifth: Courses offered by other faculties and departments

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus-1	3		3	
0302101	General Physics-1	3		3	
0304101	General Biology-1	3		3	
0305101	General Geology	3		3	
0301131	Principles of Statistics	3		3	
1931102	Computer Skills for Scientific Faculties	3		3	1902098 or 1932099
0301102	Calculus 2	3		3	0301101
0302102	General Physics 2	3		3	0302101
0302112	Physics Laboratory 2	-		1	0302102 or concurrently
0301221	Normal Differential Equations 1	3		3	0301102
0304321	Biochemistry	3		4	0303232

مركز الاعتماد
و ضمان الجودة

**Sixth: Advisory Study Plan
(First) Year**

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0301101	Calculus-1	3	0301102	Calculus-2	3
0302101	General Physics-1	3	0302102	General Physics-2	3
0303101	General Chemistry-1	3	0303102	General Chemistry 2	3
	Compulsory University Requirements	3	0303106	Experimental General Chemistry for Chemistry Students	2
	Compulsory University Requirements	3	0303112	Physics Laboratory-2	1
	Obligatory school courses	3		Compulsory University Requirements	3
				Obligatory school courses	3
Total		18	Total		18

(Second) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0301221	Normal Differential Equations-1	3	0303232	Organic Chemistry 2	3
0333211	Analytical Chemistry	3	0303236	Experimental organic Chemistry 1	2
0303216	Experimental Analytical Chemistry	1	0303241	Physical Chemistry 1	3
0303221	Inorganic Chemistry 1	3	0343311	Instrumental Analysis	3
0303231	Organic Chemistry 1	3		school courses	3
	school courses	3		Compulsory University Requirements	3
Total		16	Total		17

(Third) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0303246	Experimental Physical Chemistry 1	2	0333312	Electroanalytical Chemistry	3
0303316	Experimental Instrumental Analysis	1	0303322	Inorganic Chemistry 3	3
0303321	Inorganic Chemistry 2	3	0303326	Experimental Inorganic Chemistry	3
0333336	Systematic Identification of Organic Compounds	3	0303331	Organic Chemistry 3	3
0303341	Physical Chemistry 2	3	0303346	Experimental Physical Chemistry 2	2
	Compulsory University Requirements	3		Compulsory University Requirements	3
Total		15	Total		17

(Fourth) year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0303342	Physical Chemistry 3	3		Elective specialty courses	3
0303351	Industrial Chemistry 1	3		Elective specialty courses	3
0333391	Search of Chemical Literature	1		Elective specialty courses	3
	Elective specialty courses	3		Elective university requirements	3
	Elective specialty courses	3		Elective university requirements	3
	Compulsory university requirements	3			
Total		16	Total		15

الخطة الدراسية المعتمدة

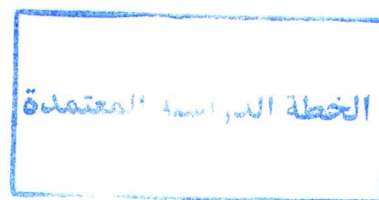
Course Description

- 0303099 Prerequisite Chemistry (3 Credit Hours)**
Prerequisite: None
Measurements; matter and energy; atoms and elements; compounds and chemical bonds; chemical reactions; solutions; acids and bases; organic chemistry.
- 0303101 General Chemistry 1 (3 Credit Hours)**
Prerequisite: High School Chemistry or 0303099
Measurements and significant figures, chemical reactions; stoichiometry; the gaseous state; thermochemistry; electronic structure and periodicity; chemical bonding; molecular shapes; states of matter and intermolecular forces.
- 0303102 General Chemistry 2 (3 Credit Hours)**
Prerequisite: (0303101)
Physical properties of solutions; chemical kinetics; chemical equilibrium; acids and bases; acid-base equilibria in aqueous solutions; solubility and complex ion equilibria; chemical thermodynamics; electrochemistry.
- 0303106 Experimental General Chemistry for Chemistry Students (2 Credit Hours)**
Prerequisite: (0303102 or concurrently)
Safety and laboratory rules; chemical observations; Avogadro's number; stoichiometry; volumetric analysis; oxidation and reduction; colligative properties; thermochemistry, chemical kinetics; equilibrium; solubility product constant; electrochemistry; thermodynamics.
- 0333109 Experimental General Chemistry for Non-chemistry Students (1 Credit Hour)**
Prerequisite: (0303101 or concurrently)
Safety and laboratory rules; chemical observations; Avogadro's number; stoichiometry; volumetric analysis; oxidation and reduction; colligative properties; thermochemistry and equilibrium.
- 0333211 Analytical Chemistry (3 Credit Hours)**
Prerequisite: (0303102)
The scope and importance of analytical chemistry; errors and statistical evaluation of data; equilibrium and equilibrium calculations; gravimetric analysis; volumetric analysis; precipitation titrations, complexometric titrations, acid-base titrations.
- 0303216 Experimental Analytical Chemistry (1 Credit Hour)**
Prerequisite: (0333211 or concurrently) + 0303106)
The course includes experiments dealing with the following topics: statistical treatment of data; gravimetric analysis; acid-base titrations; precipitation titrations; complexometric titrations; redox titrations, analysis of real samples.

- 0303221 Inorganic Chemistry 1 (3 Credit Hours)**
Prerequisite: (0303102)
Hydrogen-like wave functions; polyelectronic systems; energy states; shielding and atomic properties; symmetry and character table; ionic bonding: lattice energy, packing and ionic sizes, Born-Haber cycle and applications; covalent bonding: valence bond theory, molecular orbital theory; electronegativity; structure and reactivity; chemical forces.
- 0303231 Organic Chemistry 1 (3 Credit Hours)**
Prerequisite: (0303102)
Alkanes and cycloalkanes; alkenes and alkynes; stereochemistry; common organic reactions: substitution, addition, elimination.
- 0303232 Organic Chemistry 2 (3 Credit Hours)**
Prerequisite: (0303231)
Introduction to organic spectroscopy; conjugated systems; aromatic compounds; alcohols and ethers; carbonyl compounds; carboxylic acids and derivatives; amines; phenols; aryl halides.
- 0333233 Organic Chemistry for Non-chemistry Students (3 Credit Hours)**
Prerequisite: 0303101
Hydrocarbons: alkanes, cycloalkanes, alkenes, alkynes; aromatic compounds; stereochemistry; halides; alcohols; phenols; ethers; amines; carbonyl compounds and carboxylic acids.
- 0303236 Experimental Organic Chemistry 1 (2 Credit Hours)**
Prerequisite: 0303231 + 0303106
The course includes basic techniques used in identification, purification and separation of organic compounds: melting point determination, distillation, crystallization, extraction, chromatography; basic organic reactions as elimination, addition substitution and oxidation-reduction and their use in preparation of simple organic compounds, and testing of some classes of organic compounds.
- 0303239 Experimental Organic Chemistry for Non-chemistry Students (1 Credit Hour)**
Prerequisite: (0333233 or concurrently) + 0333109
The course involves separation, purification of and identification organic compounds through their physical properties: melting point, distillation, crystallization, extraction, and chromatography; preparation of simple organic compounds; qualitative tests for selected classes of organic compounds.

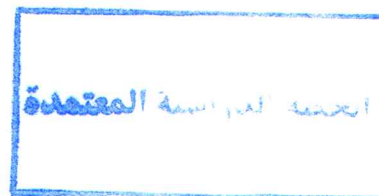
الخطة الدراسية المعتمدة

- 0303241 Physical Chemistry 1 (3 Credit Hours)**
Prerequisite: (0303102 + 0301102)
Gases and kinetic molecular theory; first law of thermodynamics and thermochemistry; the second and third laws of thermodynamics; chemical equilibrium; phases and solutions; phase equilibria.
- 0303246 Experimental Physical Chemistry 1 (2 Credit Hours)**
Prerequisite: (0303241 + 0303106)
Selected experiments representing the following subjects in physical chemistry: thermodynamics, chemical equilibrium, phase equilibria, colligative properties, partial molar quantities, ionic activity and solubility.
- 0343311 Instrumental Analysis (3 Credit Hours)**
Prerequisite: (0333211)
Instrumental analysis and classical analysis; general components of analytical instruments; UV-VIS spectroscopy; IR spectroscopy; atomic absorption and emission spectroscopy; gas chromatography; high performance liquid chromatography; electrophoresis.
- 0333312 Electroanalytical Chemistry (3 Credit Hours)**
Prerequisite: (0343311)
Oxidation-reduction reactions; galvanic cells; standard electrode potential; oxidation-reduction titrations; applications of redox titrations; potentiometric methods; electrogravimetry; coulometry; voltammetric methods; polarography; electrode kinetics, thermodynamics of electrochemical reactions.
- 0303316 Experimental Instrumental Analysis (1 Credit Hour)**
Prerequisite: (0343311 or concurrently) + 0303216)
The course includes experiments covering the following instrumental methods of analysis: UV-VIS spectrophotometry; IR spectroscopy; atomic absorption spectroscopy; flame photometry; gas chromatography; high performance liquid chromatography; electrophoresis.
- 0303321 Inorganic Chemistry 2 (3 Credit Hours)**
Prerequisite: (0303221)
Coordination compounds: theories of bonding: valence bond theory, crystal field theory, molecular orbital theory; spectroscopy; magnetic properties; coordination numbers: isomerism, chemical properties of transition metal compounds; introduction to organometallic chemistry.



- 0303322 Inorganic Chemistry 3 (3 Credit Hours)**
Prerequisite: (0303321)
Some aspects of molecular structure and bonding; chemistry of hydrogen; chemistry of the main group elements: groups: IA (alkali); IIA (alkaline earth); IIIA-VIA-VIA; VIIA (halogens); VIII (noble gases); Jordanian ores: metallurgy and applications.
- 0333323 Nuclear and Radiochemistry (3 Credit Hours)**
Prerequisite: (0303102)
Introduction; nuclear structure and binding energy; radioactive decay processes; equations of radioactive decay and growth; interaction of radiation with matter; nuclear energy; applications in chemistry.
- 0303326 Experimental Inorganic Chemistry (3 Credit Hours)**
Prerequisite: (0303321+0303106)
Synthesis of selected transition and nontransition; metal complexes and study of their chemical; magnetic; conductance and spectral properties. The course also includes a series of lectures covering the theoretical aspects of inorganic synthesis and structure elucidation.
- 0303331 Organic Chemistry 3 (3 Credit Hours)**
Prerequisite: (0303232)
 β -dicarbonyl compounds synthesis and reactions, Chemistry of biologically important organic compounds: carbohydrates; lipids; amino acids and proteins; nucleic acids.
- 0333336 Systematic Identification of Organic Compounds (3 Credit Hours)**
Prerequisite: (0303232 + 0303236)
Multistep syntheses; classification tests for functional groups; identification of unknown organic compounds by physical, chemical and spectroscopic techniques, and by the preparation of derivatives. The course also includes a series of lectures related to the theoretical aspects of the experimental part.
- 0303341 Physical Chemistry 2 (3 Credit Hours)**
Prerequisite: (0303241)
Solutions of electrolytes and Debye-Huckel theory, electrochemical cells, kinetics of elementary reactions, composite reaction mechanisms, surface chemistry, transport properties.
- 0303342 Physical Chemistry 3 (3 Credit Hours)**
Prerequisite: (0301221 + 0303341)
Basic principles of quantum chemistry; simple harmonic motion; the rigid rotor; atomic and molecular structure; basic principles of vibrational, rotational, Raman, and electronic spectra of molecules; chemical bond: molecular orbital theory and LCAO (linear combination of atomic orbitals) theory; statistical thermodynamics.

- 0303452 Polymer Chemistry (3 Credit Hours)**
Prerequisite: (0303331)
Classification and nomenclature of polymers; polymer structure and physical properties, methods of molecular weight determination, polymers in solution and viscosity of dilute polymer solutions, step reaction polymerization, chain reaction polymerization, copolymerization, technology of polymerization processes.
- 0303453 Materials Chemistry (3 Credit Hours)**
Prerequisite: (0303341)
This introductory course covers the basic concepts of materials science, history and its relation to science and chemistry. Identification of crystalline and non-crystalline states of solids, including bond types (ionic, covalent, mineral, molecular), physical and structural properties, and band theory.
- 0303496 Experimental Chemical Research (2 Credit Hours)**
Prerequisite: (0333391+ Chemistry Department Consent)
Selected senior students undertake an original research project which is suggested and supervised by a staff member. A minimum of one day per week over the semester is allotted to laboratory work. A progress report is submitted near the end of the semester.
- 0333433 Bioorganic Chemistry (3 Credit Hours)**
Prerequisite: (0303331)
The course covers Topics of current interest in bioorganic chemistry; catalysis in organic reactions; the organic chemistry of coenzymes; compounds derived from vitamins; the organic chemistry of metabolic pathways; the organic chemistry of drugs; discovery and design; enzyme models.
- 0344321 Biochemistry (3 Credit Hours)**
Prerequisite: (0303331)
This course deals with acids, bases, and buffers. The purification and isolation of macromolecules is stressed as an introduction to the study of protein and nucleic acid. The course deals with the structure of proteins in general and the function of enzymes. Biochemical aspects of nucleic acids including gene expression and regulation are stressed. The course culminates and overview of carbohydrates, lipids and integrated cellular metabolism.



- 0303346 Experimental Physical Chemistry 2 (2 Credit Hours)**
Prerequisite: (0303246 + 0303341)
Selected experiments representing the following subjects in physical chemistry: Ionic activity; electrical conductivity; electrochemical properties; surface chemistry; electromagnetic spectra; chemical reactions kinetics and reaction rates.
- 0303351 Industrial Chemistry 1 (3 Credit Hours)**
Prerequisite: (0303241)
Basic principles, characteristics of the chemical industry, material and energy balance, raw materials for chemical industry, production processes for organic chemical industries, basic chemicals from petroleum, industrial polymers, detergents, chemical industrial process development, technology of chemical processes, selected industrial processes.
- 0333361 Software Packages in Chemistry (2 Credit Hours)**
Prerequisite: (0303341)
Software for chemical education; statistics of chemistry; interactive training in analytical chemistry; regression analysis; computational thermochemistry; reaction kinetics; molecular modeling.
- 0333391 Search of Chemical Literature (1 Credit Hour)**
Prerequisite: (Chemistry Department Consent)
The course is intended to get the students acquainted with sources of scientific and chemical literature with emphasis on the use of chemical abstracts, chemical abstract indexes, chemical journals, and computer data basis. The course also includes the writing of a short report about a recent topic in chemistry and giving a short representation.
- 0353411 Special topics in Analytical Chemistry (3 Credit Hours)**
Prerequisite: (0333312)
Water quality, chemistry of the environment, pharmaceutical analytical applications.
- 0333412 Environmental Analytical Chemistry (3 Credit Hours)**
Prerequisite: (0303311)
This course is pivoted at analysis of the environment; analysis of major and minor constituents in air, water, earth and living matter; sampling strategies.
- 0343421 Organometallic Chemistry (3 Credit Hours)**
Prerequisite: (0303321)
Organometallic chemistry of the main group elements, (s- and p-block) and d-block transition metals; metal-carbonyls, nitrosyls, -alkyls, -carbenes, -cabyne, -alkenes, -alkynes and metallocenes; organometallic compounds of the d-block: reactions, mechanisms and use in catalysis.

- 0353422 Special Topics in Inorganic Chemistry (3 Credit Hours)**
Prerequisite: (0303322)
This course will be taught by a number of staff members in the field of inorganic chemistry under different topics according to each staff member.
- 0353431 Special Topics in Organic Chemistry (3 Credit Hours)**
Prerequisite: (0303331)
This course will be taught by a number of staff members in the field of organic chemistry under different topics according to each staff member.
- 0353432 Introduction to Heterocyclic Chemistry (3 Credit Hours)**
Prerequisite: (0303331)
Synthesis and reactions of the following classes of heterocycles: saturated heterocycles containing one heteroatom (N, O or S); heteroaromatics: furan, thiophene, pyrrole, pyridine, quinoline and isoquinoline; indole; nomenclature of condensed heteroaromatics; natural occurrence and biological activity of heterocyclic compounds.
- 0353436 Advanced Experimental Organic Chemistry (3 Credit Hour)**
Prerequisite: (0333336)
Multistep synthesis of some organic compounds using named synthetic reactions, and confirmation of their chemical structures by different spectroscopic techniques. The course also includes submission of a final report summarizing the methods, results, discussion, and documentation.
- 0303441 Advanced Physical Chemistry (3 Credit Hours)**
Prerequisite: (0303342)
The course deals mainly with the use of physiochemical methods to understand the atomic and molecular structure. The details of the topics could vary according to staff member and student needs. Some of the topics that can be covered are: resonance methods, Mossbauer, microwave, IR and Raman, electronic spectra of molecules, Bohr and Sommerfeld methods, laser, NMR, ESR, CD, ORD, MS.
- 0333442 Colloid and Surface Chemistry (3 Credit Hours)**
Prerequisite: (0303341)
Introduction to colloid and surface chemistry; system stability; instruments used in colloid and surface chemistry; sedimentation and diffusion; viscosity; surface tension; and light scattering; colloidal structure in surfactant solution; emulsions and microemulsions and their applications.
- 0333451 Industrial Chemistry 2 (3 Credit Hours)**
Prerequisite: (0303341)
Industrial chemical kinetics, industrial catalysis and catalysts, industrial separation processes, production processes for inorganic chemical industries, the chemical industry and large-scale chemical manufacturing, the salts industry, sources of chemicals other than natural gas and petroleum.