Form: Study Plan- Bachelors	Form Number	EXC-01-03-02A
	Issue Number and Date	2963/2022/24/3/2 5/12/2022
	Number and Date of Revision or Modification	2/(10/12/2023)
	Deans Council Approval Decision Number	50/2023
	The Date of the Deans Council Approval Decision	26/12/2023
	Number of Pages	24

1.	School	**Science**
2.	Department	**Chemistry**
3.	Program title (Arabic)	بكالوريوس العلوم في الكيمياء الصناعية
4.	Program title (English)	**Bachelor of Science in Industrial Chemistry**

5. Components of Curriculum:
The curriculum for the bachelor's degree in industrial chemistry consists of (140) credit hours distributed as follows:

Number	Type of requirement	Credit hours
First	University requirements	**27**
Second	Faculty requirements	**21**
Third	Department requirements	**80**
Fourth	Other courses provided by other departments	**12**
Total		**140**

6. Numbering System:

A- Department number

Number	Department
01	Mathematics
02	Physics
03	Chemistry
04	Biology
05	Geology
08	Clinical Sciences

B- Course number

Domain number	Domain title	Domain number	Domain title
0	General Chemistry	**5**	Industrial Chemistry
1	Analytical Chemistry	**6**	Software packages in Chemistry
2	Inorganic Chemistry	**7**	
3	Organic Chemistry	**8**	
4	Physical chemistry	**9**	Field Training

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C- Course number consists of 7 digits

School		Department	Level		Serial number	
0	3	6	3	1	0	1

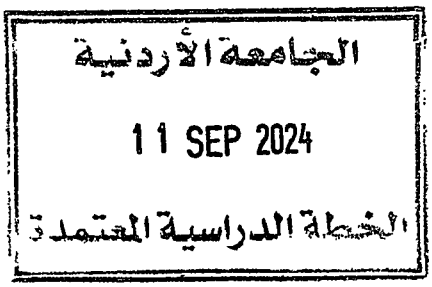
First: University Requirements:

Compulsory Requirements (18 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military Science	2220100	3		
2	National Culture	3400100	3		
3	Introduction to Philosophy and Critical Thinking	3400103	3	1932099, 3410100	
4	Ethics and Human Values	3400100	3		
5	Entrepreneurship Innovation	3400101	3	1932099, 3410100	
6	Life and Practical Skills	3400102	3	1932099, 3410100	

Preparation Program Requirements

All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program

(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



Electives (9 Credit Hours)					
Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.					
(First Group)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	Great Books	3400107	3		
2	Islam and Contemporary 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		
6	Digital Skills	1900102	3		
Electives					
(Third Group)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	Foreign Language	2200103	3		
2	Electronic Commerce	1600100	3		
3	Social Media	1900101	3		
4	Appreciation of Arts	2000100	3		
5	Special Subject	3400106	3		

Second: School courses: distributed as follows:

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

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus-1	3	-	3	-
0301131	Principles of Statistics	3	-	3	-
0302101	General Physics-1	3	-	3	
0303101	General Chemistry-1	3	-	3	
0304101	General Biology-1	3	-	3	-

0305101	General Geology-1	3	-	3	-
1900103	Modern Digital Skills	3	-	3	1932099

Third: Specialty courses: (92) credit hours distributed as follows:
A. Obligatory specialty courses: (80) credit hours
B. Elective specialty courses: (12) credit hours

A. Obligatory specialty courses: (80) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301107	Calculus-2- for chemistry students	2	-	2	0301101
0303102	General Chemistry-2	3	-	3	0303101
0303106	Experimental General Chemistry	1	3	2	0303101 or concurrently 0303102
0333211	Analytical Chemistry	3	-	3	0303102
0303216	Practical Analytical Chemistry	-	3	1	0303106 + 0333211 or +concurrently
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	+ 0303231 0303106
0303241	Physical Chemistry-1	3	-	3	+ 0303102 0301107
0303246	Experimental Physical Chemistry-1	1	3	2	0303241 + 0303106
0363213	Methods of Chemical Analysis	3	-	3	0303211
0363217	Experimental Methods of Chemical Analysis	-	3	1	0363213 or concurrently + 0303216
0303321	Inorganic Chemistry-2	3	-	3	0303221
0303326	Experimental Inorganic Chemistry	1	5	3	+0303106 0303321
0303341	Physical Chemistry-2	3	-	3	0303241
0303346	Experimental Physical Chemistry-2	1	3	2	0303341 + 0303246
0363251	Principles of Industrial Chemistry	3	-	3	0303102
0363313	Methods of industrial chemical analysis	2	-	2	0363213
0363317	Experimental methods of industrial chemical analysis	1	3	2	0363217 +

					(0363313 or concurrently)
0363335	Biochemistry	2	-	2	0303232
0363351	Industrial Organic Chemistry	2	-	2	0303232+ 0363251
0363352	Industrial Inorganic Chemistry	2	-	2	0303321 + 0363251
0363353	Experimental Industrial Inorganic Chemistry	-	3	1	0303326 + (0363352 or concurrently)
0363354	Polymers Industry	2	-	2	0303232 + 0363251
0363355	Experimental Industrial Organic and Polymer Chemistry	-	3	1	0303236 + (0363354 + 0363351) or concurrently
0363356	Petrochemical Industries	2	-	2	0363251 + 0303232
0363357	Experimental Petrochemical Industries	-	3	1	0363356 or concurrently
0363491	Field Training	-	-	3	Finish 90 credit hours
0363492	Final year project	-	-	2	Finish 90 credit hours
0643340	Principles of Food Engineering	2	3	3	0303241
0905304	Basics of chemical engineering for non-chemical engineers	3	-	3	0303241
1212331	Pharmaceutical Technology-1	2	-	2	0303241 + 0363351
1212332	Practical Pharmaceutical Technology-1	-	3	1	1212331 or concurrently
0363393	Employability Readiness	-	-	4	Finish 90 credit hours

A. Elective specialty courses: (12) credit hours:

	Course Title	**Contact Hours**		**Pre-requisite**

Course Number		Theoretical	Practical	Credit Hours	
0363411	Quality Control in the Chemical Industry	2	-	2	0363313
0363414	Introduction to marine chemistry	2	-	2	0363213
0363451	Industrial Heterogeneous Catalysis	2	-	2	0363352
0363452	Industrial application of surfaces and colloids chemistry	2	-	2	0303341
0363453	Materials Science & Nanotechnology	2	-	2	0303341
0363454	Corrosion Chemistry	2	-	2	0303241
0363455	Green Chemistry	2	-	2	0303231
0363456	Chemical safety for laboratories and industrial processes	2	-	2	0363351 + 0363352
0363457	Industrial electrochemistry	2	-	2	0363313 + 0303341
0363461	Computational Chemistry & Molecular Modeling	1	3	2	0303341
0643341	Food preservation	2	3	3	0363351 or 0633220
0603321	Food Chemistry	3	-	3	0303231 or 0333233
0603323	Food Analysis	2	-	2	0333211
0633445	Processing of fats and oils	2	-	2	0303102
1202333	Pharmaceutical Technology-2	2	-	2	1212331 +1212332
1202334	Pharmaceutical Technology- 2 Practical	-	3	1	1202333 or concurrently
0603420	Food Additives	2	-	2	0303102
0905382	Economics and management for chemical industries	3	-	3	0905304

Fourth: Courses offered by other faculties and departments

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301107	Calculus-2- for chemistry students	2	-	2	0301101
0905304	Basics of chemical engineering for non-chemical engineers	3	-	3	0303241
1212331	Pharmaceutical Technology-1	2	-	2	0303241 + 0363351
1212332	Practical Pharmaceutical Technology-1	-	3	1	1212331 or concurrently
0643340	Principles of Food Engineering	2	3	3	0303241
1202333	Pharmaceutical Technology-2	2	-	2	1212331 +1212332
1202334	Pharmaceutical Technology-2 Practical	0	3	1	1202333 or concurrently
0643341	Food preservation	2	3	3	0363351 or 0633220
0603420	Food Additives	2	-	2	0303102
0603321	Food Chemistry	3	-	3	0303231 or 0333233
0603323	Food Analysis	2	-	2	0333211
0633445	Processing of fats and oils	2	-	2	0603321
0905382	Economics and management for chemical industries	3	-	3	0905304

Fifth: 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	0301107	Calculus-2 for chemistry students	2
0302101	Physics-1	3	0303102	General Chemistry-2	3
0303101	General Chemistry-1	3	0303106	Experimental General Chemistry-1	2
	University requisite	3		University requisite	3
	University requisite	3		University requisite	3
	School requisite	3		School requisite	3
Total		**18**	**Total**		**16**

Second Year

First Semester			Second Semester		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0333211	Analytical chemistry	3	**0303232**	Organic Chemistry-2	3
0303221	Inorganic Chemistry-1	3	**0303236**	Experimental Organic Chemistry-1	2
0303231	Organic Chemistry -1	3	**0303241**	Physical Chemistry-1	3
0363251	Principles of industrial chemistry	3	**0303216**	Experimental Analytical Chemistry	1
	University requisite	3	**0363213**	Methods of chemical analysis	3
	School requisite	3		University requisite	3
				School requisite	3
Total		**18**	**Total**		**18**

Third Year

First Semester			Second Semester		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0303246	Experimental Physical Chemsitry-1	2	**0303326**	Experimental Inorganic Chemistry	3
0363217	Experimental Methods of Chemical Analysis	1	**0303346**	Experimental Physical Chemistry-2	2
0303321	Inorganic Chemistry-2	3	**0363352**	Industrial Inorganic Chemistry	2

0363351	Industrial Organic Chemistry	2	**0363354**	Polymers Industry	2
0303341	Physical Chemistry-2	3	**0363355**	Experimental Industrial Organic and Polymer Chemistry	1
0905304	Basics of chemical engineering for non-chemical engineers	3	**0363356**	Petrochemical industries	2
	University requisite	3	**1212331**	Pharmaceutical Tehnology-1	2
			1212332	Pharmaceutical Technology-1 Practical	1
Total		**17**	**Total**		**15**

Summer Semester		
Course Number	**Course Title**	**Credit Hours**
0363491	Field Training	3
0363393	Employability Readiness	4
Total		**7**

Fourth Year

First Semester			Second Semester		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0363353	Experimental Industrial Inorganic Chemistry	1		Specialty Elective Requisite	2
0363357	Experimental Petrochemical Industries	1		Specialty Elective Requisite	2
0363313	Methods of industrial chemical analysis	2		Specialty Elective Requisite	2
0363317	Experimental methods of industrial chemical analysis	2		Specialty Elective Requisite	2
0363335	Biochemistry	2	**0363492**	Final year project	2
0643340	Principles of Food Engineering	3		University Requisite	3
	Specialty elective requisite	2			
	Specialty elective requisite	2			
	University Requisite	3			
Total		**18**	**Total**		**13**

Course Description

0303101	General Chemistry-1	3 Credit Hours
Prerequisite:		
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, chemical thermodynamics, acid-base equilibria in aqueous solutions, solubility and complex ion equilibria, electrochemistry.		

0303106	Experimental General Chemistry	2 Credit Hours
Prerequisite: (0303101 or concurrently 0303102)		
The course includes experiments dealing with the following topics: safety and laboratory rules, chemical observations, stoichiometry, volumetric analysis, oxidation and reduction, colligative properties, thermochemistry, chemical kinetics, equilibrium, electrochemistry, thermodynamics.		

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: (0303211 or co-requisite+ 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)		
Fundamental particles of an atom, Bohr's theory; success in early quantum theory, an introduction to wave mechanics; atomic orbitals; quantum numbers; many-electron atoms; effective nuclear charge and Slater's rules; Hund's rule; Aufbau principle; ionization energies and electron affinities; Lewis bonding theory; valance bond theory (VB); molecular orbital theory (MO); octet rule and isoelectronic species; electronegativity and dipole moments; VSEPR model; stereoisomers; hybridization; structures and energies of metallic and ionic solids; packing of spheres; polymorphism in metals; alloys and intermetallic compounds; bonding in metals and semiconductors; Schottky and Frenkel defect; band theory and Fermi level; ionic lattices; lattice energy; Born-Haber cycle; Kapustinskii equation; acids, bases and ions in aqueous solution; solubility of ionic salts; energetics of dissolution of ionic salts; properties of water; Brønsted acids and bases; Hard/Soft Acid/Base Theory (HSAB); introduction to coordination complexes.		

0303231	Organic Chemistry 1	3 Credit Hours
Prerequisite: (0303102)		
Alkanes and cycloakanes, alkenes and alkynes, conjugated alkenes, stereochemistry, common organic reactions: substitution, addition, elimination. Alcohols, ethers, conjugated systems.		

0303232	Organic Chemistry 2	3 Credit Hours
Prerequisite: (0303231)		
Introduction to organic spectroscopy, aromatic compounds, carbonyl compounds, carboxylic acids and derivatives, phenols, aryl halides.		

0303236	Experimental Organic Chemistry-1	2 Credit Hours
Prerequisite: (0303231 + 0303106)		
The course covers basic techniques used in the identification, purification and separation of organic compounds: melting point determination, distillation, crystallization, extraction, chromatography. Simple preparative experiments, qualitative tests for selected classes of organic compounds.		

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, solutions of electrolytes, electrochemical cells.		

0303246	Experimental Physical Chemistry-1	2 Credit Hours
Prerequisite: (0303241 + 0303106)		
Selected experiments representing the following subjects in physical chemistry: Thermal chemistry, thermodynamics & chemical equilibrium, phase equilibria & colligative properties.		

0363213	Methods of Chemical 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.		

0363217	Experimental Methods of Chemical Analysis	1 Credit Hour
Prerequisite: (0363213 or co-requisite + 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, crystal field, molecular orbital, spectroscopy, magnetic properties, selected coordination numbers, isomerism, chemical properties, introduction to organometallic chemistry.

0303326	Experimental Inorganic Chemistry	3 Credit Hours
Prerequisite: ((0303321 + 0303106))		
This course focuses on the preparation and characterization of coordination complexes using various ligands. The course also includes a series of lectures that delve into the theoretical aspects of inorganic synthesis and structure elucidation .Upon successful completion of this course, students will be able to independently conduct the experimental preparation of coordination complexes. Additionally, students will gain proficiency in characterizing these complexes through techniques such as melting point determination, molecular weight analysis, room temperature magnetic measurements, conductance studies, and spectral analysis (including FTIR and UV)		

0303341	Physical Chemistry-2	3 Credit Hours
Prerequisite: (0303241)		
Solution of electrolytes and Debye-Huckel theory, electrochemical cells, kinetics of elementary reactions, composite reaction mechanisms, surface chemistry, transport properties.		

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.		

0363251	Principles of Industrial Chemistry	3 Credit Hours
Prerequisite: (0303102)		
This course covers industrial chemical kinetics and reaction control, batch process, continuous process, catalysis, industrial separation process, distillation, and extraction. Energy sources, raw materials for industrial organic chemicals (petroleum, natural gas, and coal), and industrial inorganic chemicals. Overview of the chemical industry in Jordan, capital cost estimating, and process safety.		

0363313	Methods of Industrial Chemical Analysis	2 Credit Hours
Prerequisite: (0363213)		
This course covers the principles, theoretical and practical aspects of chemical analysis methods used in industry. These include methods of validation the correctness and accuracy of analysis, methods of extraction and their applications in industry, analysis of drugs, detergents, cosmetics, dyes, pesticides, oils, fats, and natural products.		

0363317	Experimental Methods of Industrial Chemical Analysis	2 Credit Hours
Prerequisite: (0363313 + 0363217 or concurrently)		
This course will cover the practical side of methods of industrial chemical analysis.		

0363351	Industrial Organic Chemistry	2 Credit Hours
Prerequisite: (0303251 + 0303232)		
The course will cover the modern and basic industrial methods and techniques used to produce organic chemicals, with a focus on chemical synthesis. The industries covered in the course include soap, detergents, surface coatings, pulp and paper, adhesives, essential oil industry, dyes and pigments, personal care products, and fine chemicals.		

0363352	Industrial Inorganic Chemistry	2 Credit Hours
Prerequisite: (0363251 + 0303321)		
This course introduces some important topics related to industrial inorganic chemistry covering preparation of some industrial inorganic products and the challenges involved, such as: Sulphur industry, nitrogen based industrial products, mineral extraction, mineral fertilizers, industrial and domestic water production, industrial gas productions, inorganic solids, cement, glasses, and pigments. Emphasis is on learning the importance of inorganic chemical industry, its economic impact, individual chemical processes and production challenges.		

0363353	Experimental Industrial Inorganic Chemistry	1 Credit Hours
Prerequisite: (0363352 or co-requisite + 0303326)		
This course will cover the practical side of industrial inorganic chemistry.		

0363354	Polymers Industry	2 Credit Hours
Prerequisite: (0363251 + 0303232)		
Cornerstones of polymer science: synthesis, characterization, processing and properties. Monomer synthesis, polymerization chemistry, reactors and scale-up, polymer structure (solution and solid state), morphology and processability. Concepts and definitions: monomers, degree of polymerization, homopolymers, copolymers, nomenclature and classification, chain structure, microstructure, conformation and flexibility, average molecular weights and polydispersity, thermoplastics, thermosets, elastomers, fibres, plastics; Polymerization methods: step-growth, radical, living radical, anionic, cationic, catalytic, ring opening metathesis, Methods of molecular weight determination: membrane and vapor pressure osmometry, light scattering, size exclusion chromatography, viscometry; Properties: thermal, mechanical, flow; Fundamentals of polymer processing: extrusion, injection, film blowing. Introduction to polymer processing.		

0363355	Experimental Industrial Organic and Polymer Chemistry	1 Credit Hour
Prerequisite: 0303236 + (0363351 + 0363354) or co-requisite		
This course will cover the practical side of industrial organic chemistry.		

0363356	Petrochemical Industries	2 Credit Hours
Prerequisite: (0363251 + 0303232)		
The course provides an overview of the petrochemical industry and chemists' insights into the underlying thinking used in this industry. More specifically, the course covers general aspects concerning petroleum, the formation of petroleum, aspects of resources, refinement of petroleum, important processes in petrochemical industry, petrochemicals, polymers, catalysis, and reaction		

kinetics. The course is suitable for all students with an interest in the chemistry of natural gas, oil, coal, and petrochemical industries in general. Simultaneously, the course also includes laboratory experiments for different processes and techniques, covered in the course with one credit hour.

0363357	Experimental Petrochemical Industries	1 Credit Hour
Prerequisite: 0363356 or co-requisite		
This course will cover the practical side of petrochemical industries.		

0363491	**Field Training**	**3 Credit Hours**
Prerequisite: (Successfully passed 90 credit hours)		
The student will undergo training for 200 effective hours in one of the factories in Jordan that is associated with a certain chemical industry. The training will be in coordination between the student's academic department and the chemical plant/company of interest. The field training is partial.		

0363492	**Final year project**	**2 Credit Hours**
Prerequisite: (Successfully passed 90 credit hours)		
The final year project focuses on practical skills directly applicable to the student's future career. Under the supervision of a faculty member, the student will learn research methods, critical thinking, and new experimental tools while also developing their communication and teamwork skills.		

0363411	**Quality Control in the Chemical Industry**	**2 Credit Hours**
Prerequisite: (0363313)		
This course covers scientific and practical aspects of laboratory and manufacturing practices taking into consideration the national and international standards of various national and international organizations such as ISO, Food & Drug Administration (FDA) and its Jordanian correspondent (JFDA) and European Union regulations. Also, this course will cover risk analysis system and critical control points. This course also includes some international and local constitutions in the fields of drugs (USP & British pharmacopoeias), food, and other chemical industries.		

0363414	**Introduction to Marine Chemistry**	**2 Credit Hours**
Prerequisite: (0363213)		
This course covers the physical and chemical properties of sea water, dissolved gases in sea water, planktons and dissolved materials in sea water, marine pollution, desalination plant.		

0363451	**Industrial Heterogeneous Catalysis**	**2 Credit Hours**
Prerequisite: (0363352)		
This course covers the Introduction: Homogeneous Catalysis, Heterogeneous Catalysis, Thermodynamics and energetic aspects, Kinetics of heterogeneous Catalysis, Adsorption, Metal Catalysis and trends in the periodic table, Taylor's theory of active centres, Multiple theory of catalysis, Methods of studying catalysis, Catalysis for industrial processes, Enzyme-based catalysis.		

0363452	**Industrial Application of Surfaces and Colloids Chemistry**	**2 Credit Hours**

Prerequisite: (0303341)	
The course introduces surface and colloid chemistry and how it influences industrial processes. Some of the subjects covered in this course are formation and stability of colloidal systems and emulsions, instrumentations used in surface and colloids chemistry, precipitation and diffusion phenomena, viscosity, surface tension, light scattering, formation of colloidal systems of surface activity, emulsions and microemulsions and its applications. Some of the applications to be discussed and effect of surface and colloids chemistry on it include pharmaceutical industry, detergents, cosmetics and personal care products, food industry, paints, paper industry, polymers.	

0363453	Materials Science and Nanotechnology	2 Credit Hours
Prerequisite: (0303341)		
This course covers the composition, electronic distribution, and defects in crystals, their effects on conductivity, solid-state reactions, and catalysis. The synthesis of nanomaterials will also be studied using different paths, including the tools and methods used to characterize nanomaterials in the industry. Further advancements in the manufacture of nanoparticles for pharmaceutical purposes, and hybrid materials will also be explored.		

0363454	Corrosion Chemistry	2 Credit Hours
Prerequisite: (0303241)		
This course covers the introduction and definition of corrosion, Corrosion thermodynamics, Corrosion current, Corrosion potential, Kinetics of corrosion, Inertness of metals, Common examples of corrosion, Chemical and electrical needs for corrosion prohibition, Corrosion inhibitors.		

0363455	Green Chemistry	2 Credit Hours
Prerequisite: 0303231		
Green chemistry solutions will be discussed within the fields of chemical production: choice of feedstock, solvents, catalysts, synthesis routes including microwave and ultrasonic assisted synthesis; Chemical energy storage and conversion: chemical energy carriers, synthesis routes for alternative fuels including electro-fuels and hydrogen; Carbon dioxide utilization: conversion routes to chemicals and fuels; Emission control: chemical, automotive and shipping industry, adsorption, ion-exchange and catalytic methods.		

0363456	Chemical Safety for Laboratories and Industrial Processes	2 Credit Hours
Prerequisite: (0363351+0363352)		
This course is based on the Occupational Safety and Health Administration's (OSHA) Laboratory Standard and the principles of chemical safety and security. The course covers safe handling transportation, classification and storage of chemicals. Overview of the potentially hazardous chemicals and how to minimize exposure. Theories of ignition, flames, fire and explosion, parameters of explosion. Methods of protection and prevention of hazards: containment, suppression, flow configurations, explosion relief, and hazard level and evaluation. Safety codes and check lists. Workplace inspection and preventive maintenance. This course provides		

information on identifying risks associated with hazardous chemicals, minimizing exposure, labelling, and inventory requirements, and the correct procedures to respond to emergencies.

0363457	Industrial Electrochemistry	2 Credit Hours
Prerequisite: (0363313 + 0303341)		
This course covers the applications of electrochemistry for the manufacture of some important industrial chemicals, as well as the use of electrochemistry in coatings (galvanization), and various applications in the medical fields, chemical analysis, and waste treatment.		

0363461	Computational Chemistry and Molecular Modelling	2 Credit Hours
Prerequisite: (0303341)		
This course covers the classical mechanical calculations of macromolecules and biomolecules, quantum mechanics calculations of chemical molecules and substance interactions, drug design using molecular modelling, estimation of physical and chemical properties of chemical compounds.		

0363335	Biochemistry	2 Credit Hours
Prerequisite: (0303232)		
Introduction to the basic concepts in biochemistry. A detailed discussion of the chemistry of water, acids, bases and buffers. Basic techniques to purify macromolecules especially. Proteins, Structural organization and building blocks of proteins. Enzymes: their classification, function and kinetics. Regulation of enzyme activity. An overview of carbohydrates and lipids.		

1212331	Pharmaceutical Technology (1)	2 Credit Hours
Prerequisite: (0303241 + 0363351)		
This course covers the comprehensive survey of industrial processes used in the production of pharmaceuticals. Transfer process and unit operation with emphasis on subjects of pharmaceutical interests especially tableting.		

1212332	Pharmaceutical Technology-practical (1)	1 Credit Hour
Prerequisite: (1212331 or co-requisite)		
Cover the unit process operation (size reduction, mixing, granulation and tableting) in addition to quality control and pre-formulation, suggesting formula for certain drug knowing its physiochemical properties, formulation and evaluation using proper instruments		

1202333	Pharmaceutical Technology (2)	2 Credit Hours
Prerequisite: (1212331 + 1212332)		
This course covers the principles and designs of liquid and semisolid dosage forms. Physicochemical factors, which influence their formulation, stability and large-scale manufacture will be discussed. Subjects like microencapsulation & packaging processes will be also covered. General concepts of good manufacturing practice will be discussed.		

1202334	Pharmaceutical Technology-practical (2)	1 Credit Hour
Prerequisite: (1202333 or co-requisite)		
This course covers the applications of different tablet coating (film coating and enteric coating). Evaluating the coating process and coated dosage forms. In addition to design and evaluation of		

sustained release matrix. Quality control of semisolid dosage forms will be addressed. The evaluation of micro encapsulation will be covered.

0905304	Basics of Chemical Engineering for Non-Chemical Engineers	3 Credit Hours
Prerequisite: (0303241)		
This course covers the scope of chemical engineering and the role of chemical engineers. Introduction and overview of chemical engineering systems, processes, and analysis. Process flow sheeting, block flow diagrams and process flow charts. Introduction to material balances, degrees of freedom analysis, material balances for single and multiple non-reactive systems, material balance for reactive systems. Single component two-phase systems (vapor pressure). Gas-liquid systems. The phase rule and vapor-liquid equilibria. Energy balance on a closed system. Steady-state energy balance on open non-reactive and reactive systems. Simultaneous material and energy balances.		

0905382	Economics and Management for Chemical Industries	3 Credit Hours
Prerequisite: (0905304)		
This course covers the principles of chemical industries economy, variable and fixed costs, time value of money. Analysis and evaluation of capital projects. Decision analysis, comparison of alternatives, introduction to management theories and forecasting, practical case studies.		

0643340	Principles of Food Engineering	3 Credit Hours
Prerequisite: (0303241)		
Aspects such as material and energy balances, fluid flow theory, viscosity, heat transfer, unit operations, evaporation, dehydration, freeze drying, mechanical separation, mixing, size reduction and extraction, cleaning, grading, handling and waste treatment.		

0603420	Food Additives	2 Credit Hours
Prerequisite: (0303102)		
Advantages and disadvantages of food additives; their safety evaluation and regulatory aspects. Different classes of food additives with respect to chemical and physical nature, and mode of action.		

0603321	Food Chemistry	3 Credit Hours
Prerequisite: (0303231 or 0333233)		
Water and colloids and their importance in foods. Major food components with respect to classification, structure, occurrence and functions. Changes due to handling, storing, preservation and processing. Minor natural food components such as enzymes, flavors, colors and a view on additives. The practical part includes food sampling, chemical analysis and interpreting of data.		

0603323	Food Analysis	2 Credit Hours
Prerequisite: (0333211)		
The roles of food analysis, sampling, recording and interpreting of results, experimental errors; Spectroscopy theory, atomic absorption, spectrophotometry and chromatography techniques such as paper, thin layer, GLC and HPLC.		

0633445	Processing of Fats and Oils	2 Credit Hours
Prerequisite: (0603321)		
This course deals with the sources, and properties of fats and oils, methods of extraction, purification, chemical and physical derivatization. The most recent methods used for fats and oils processing, changes that may occur during processing and storage and the functional use of fats and oils and their replaces in relation to their composition and production.		

0643341	Food Preservation	3 Credit Hours
Prerequisite: (0363351 + 0633220)		
This course covers the aims and importance of food preservation. Food preservation methods including preservation by heat, refrigeration, lowering water activity, radiation, innovative preservation technologies including electric field, ultrasound, high pressure, ohmic and infrared heating.		

0363393	Employability Readiness	4 Credit Hours
Prerequisite: 90 credit hours		
The training is four weeks course, during summer semester. This training allows students to integrate and understand the nature of the job market during their theoretical academic studies. It enables them to acquire practical skills in their chemical specialties, including adherence to work values, fostering creativity, and working within a team. These skills offer them early experiences that ease their entry into the job market without placing an additional burden on employers.		