Tafila Technical University
College of Science
Department of Chemistry and
Techno - Chemistry

Study Plan Approval Date	Study Plan in Chemistry	Study Plan Code
06/11/ 2024		SCI._CHEM._0205

Tafila Technical University

College of Science

This study plan is applied to the students admitted into the Bachelor's program in Chemistry for the academic year 2024/2025

Study Plan for B.Sc. in Chemistry

Offered Degree: B.Sc. in Chemistry

Tafila Technical University
College of Science
Department of Chemistry and Techno - Chemistry

Department	Program	Official Stamp
Department of Chemistry and Techno - Chemistry	B.Sc. in Chemistry	
The Chemistry study plan was approved by the **dean's council** on 06/11/ 2024 / Decision Number (281/2024)		

TTU Chemistry Program

The department of Chemistry and Techno - Chemistry was established at the beginning of the 2005/2006 academic year, coinciding with the inception of Tafila Technical University. This was to keep pace with the significant and tremendous technological progress our world is witnessing today. This progress requires educating, training, and preparing individuals so that they can fulfil our collective aspirations for comprehensive development in all fields. With the launch of the department, two programs, i.e. the Chemistry program and Techno - Chemistry program were initiated, which are unique to Tafila Technical University. These programs aim to provide the governmental and private national institutions with qualified personnel to work as researchers, teachers, and technicians and preparing them for higher education studies as well. In addition, the two programs aim to provide high-quality educational and research programs, striving to establish and enhance the students' scientific and experimental knowledge. This is in addition to using the best educational methods in teaching and encouraging students to reach a high level of knowledge.

The department offers a bachelor's degree in chemistry and Techno - Chemistry and a Master's degree (research track) in Techno - Chemistry . The department includes 20 faculty members, assisted by nine lab supervisors and technicians. Currently, the department is working to increase its teaching staff to enhance the educational process and scientific research, and to keep up with the increasing number of students who are enrolling each year. The department has five laboratories, each accommodating up to 20 students. These are: Organic Chemistry Lab, Inorganic Chemistry Lab, Analytical Chemistry Lab, Physical Chemistry Lab, and Instrumental Analysis lab. The department continues to feed the local and Arab market with undergraduates who have proven their success and excellence in various chemical fields such as industry, chemical analysis, pharmaceutical companies, laboratory equipment, chemical materials, university teaching, and secondary education.

The department seeks to elevate the educational process according to the latest applied systems. This aligns with the mission and vision of the university, which always emphasizes implementing global quality standards for all its programs across various specializations. It also continues to support scientific research and encourages researchers with the aim of building effective cooperation with universities and research centres at both local and global levels, enabling the department to better achieve its mission and objectives.

Vision and Mission	
Vision	The Department of Chemistry and Techno - Chemistry **seeks** global excellence in the fields of education, scientific research, and industry, in line with the requirements of the modern era and serving the needs of the local community.
Mission	**Provide** practical skills to students with immediate employment. Providing distinguished educational, research and training services.

Program Objectives (POs)	
PO_1	**Providing** the undergraduate with the basic knowledge in all fields of chemistry necessary to develop the skills of criticism, analysis, scientific research, and interpretation of scientific phenomena
PO_2	**Empowering** and **qualifying** the undergraduate to excel and succeed in pursing postgraduate studies by acquiring scientific and research skills, as well as enabling them to continue their practical life in the fields of education and industry.
PO_3	**Providing** the undergraduate with the skills to deal with scientific equipment, modern educational programs, and training in scientific techniques
PO_4	**Developing** skills in using modern scientific research resources in order to build research capacities, criticism, discussion, and scientific writing skills
PO_5	**Providing** chemistry materials to serve other specializations in the departments of the College of Science, the College of Engineering, and other colleges

Program Educational Outcomes (PEOs)	
PEO_1	**Understand** the properties of chemical elements and compounds
PEO_2	**Interpreting** and analyzing scientific phenomena by linking the fields of chemistry with each other and linking basic chemistry concepts with other scientific fields (mathematics, physics, biology, and computers)
PEO_3	**Use** laboratory **skills** to design experiments on scientific foundations and apply chemical safety principles
PEO_4	**Demonstrate** a spirit of initiative and a high degree of independence to work effectively and responsibly in an individual context and within a collaborative teamwork environment.
PEO_5	**Apply** deep understanding of scientific principles in understanding, criticizing, and evaluating research issues and scientific studies, as well as in solving scientific dilemmas and interpreting scientific phenomena.

Student Learning Outcomes (SLOs)	
SLO_1	**Identify**, **formulate**, and **solve** broadly defined technical or scientific problems by applying knowledge of mathematics, science, and technical subjects in areas related to chemistry.
SLO_2	**Formulate** or **design** a system, process, procedure, or program to meet desired needs.
SLO_3	**Develop** and **conduct** experiments or test hypotheses, analyse and interpret data, and use scientific judgment to draw conclusions.
SLO_4	**Communicate** effectively with a wide range of audiences.
SLO_5	**Understand** ethical and professional responsibilities and the impact of technical and scientific solutions in global, economic, environmental and societal contexts.
SLO_6	**Work** effectively in teams that set goals, plan tasks, meet deadlines, and analyse risks.

Cognitive Domains for Chemistry Program	
Domain	**Fundamental Cognitive Domains**
1	Organic Chemistry and Biochemistry
2	Analytical Chemistry
3	Inorganic Chemistry
4	Physical Chemistry
5	Advanced application in chemistry
	Supporting Cognitive Domains
	Courses support the Chemistry program that are offered by department of Applied physics and Mathematics

Numbering System for Chemistry Program				
College NO.	Program NO.	Course Level	Domain NO.	Course order within the cognitive Domain
02	05	From 1 to 4	From 1 to 5	From 1 to 9

Credit Hours Distribution for B.Sc. in Chemistry			
Classification	**Credit Hours**		
	Obligatory	**Elective**	**Total**
University Requirements	21	6	27
College Requirements	21	0	21
Specialty Requirements	77	09	86
	119	**15**	**134**

Classification of the Requirements for the B.Sc. Degree in Chemistry According to Teaching Mode (Online – Blended – Face to Face)

Classification / Requirements	Specialty Requirements		College Requirements	Elective University Requirements	Obligatory University Requirements
	Obligatory	Elective			
Credit Hours	77	9	21	6	21
% Credit Hours	57.8 %	6.7 %	15.6 %	4.4 %	15.6 %
% (Total)	**64.4 %**		**15.6 %**	**20.0 %**	

Teaching Methods	Specialty Requirements			College Requirements			Elective University Requirements			Obligatory University Requirements		
	F-to-F	Blended	Online	F-to-F	Blended	Online	F-to-F	Blended	Online	F-to-F	Blended	Online
Credit Hours	63	23	0	3	18	0	0	0	6	0	0	21
% (Total)	46.7 %	17 %	0 %	2.2 %	13.3 %	0 %	0 %	0 %	4.4 %	0 %	0 %	15.6 %

First: Obligatory University Requirements (21 Credit Hours)

Course NO.	Course Name	Number Of Credit Hours			Pre-requisite	Teaching Method
		Theoretical	Practical	Total		
0501100	Communication Skills in Arabic Language	3	0	3	(1)	Online
0502100	Communication Skills in English Language	3	0	3	(2)	Online
0603099	Computer complementary course (3)	3	0	0	------	Online
0302100	Life skills	3	0	3	None	Online
0301199	Leadership and Social Responsibility	3	0	3	None	Online
0404199	Entrepreneurship and innovation	3	0	3	None	Online
0503101	National Education (4)	3	0	3	None	Online
0503112	Military Science (4)	3	0	3	None	Online

(1) "Arabic Placement Test" or Prerequisite Arabic Language 0501099.
(2) "English Placement Test" or Prerequisite English Language 0502099.
(3) " Computer skill placement test" 0602098 , If the student passes placement test, the grade will record "pass".
(4) Obligatory course for Jordanian students and optional for non-Jordanians. Non-Jordanian students, who do not choose this course, must study another course from the elective university requirements and the grade for this course will not be included in the student's GPA, but will be counted as **pass** or **fail**.

Second: Elective University Requirements (6 Credit Hours)

The student can choose one course from each of the following **groups**:

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Method
		Theoretical	Practical	Total		
Humanities Group						
Offered by College of Arts, College of Education and College of Business						
0302099	Islamic Culture	3	0	3	None	Online
0503108	Human Rights	3	0	3	None	Online
0503110	Introduction to Domestic Violence	3	0	3	None	Online
0301102	Principles of Thinking	3	0	3	None	Online
0301105	Family Counseling	3	0	3	None	Online
0404100	Work Ethics	3	0	3	None	Online
0403099	Development and Environment	3	0	3	None	Online
Applied Sciences Group						
Offered by College of Engineering, College of Science and College of Information Technology andTelecommunication						
0105103	Mineral Resources in Jordan	3	0	3	None	Online
0601104	E-Learning	3	0	3	None	Online
0602100	Digital Culture	3	0	3	None	Online
0106140	Traffic Safety	3	0	3	None	Online
0105102	Sustainable Development	3	0	3	None	Online
0202103	Physics and Society (5)	3	0	3	None	Online
0212111	Radiation Sources and its Applications (5)	3	0	3	None	Online

(5) Can be chosen by all university students except students of Applied Physics Department.

Third: Obligatory College Requirements (21 Credit Hours)

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Method
		Theoretical	Practical	Total		
0213105	Calculus 1	3	0	3	(1)	Blended
0213106	Calculus 2	3	0	3	0213105	Blended
0213101	General Physics 1	3	0	3	(2)	Blended
0213107	General Chemistry 1	3	0	3	(3)	Blended
0213109	General Biology 1	3	0	3	None	Blended
0213131	Principles of Statistics 1	3	0	3	None	Blended
0213103	General Physics Laboratory 1	0	3	1	0213101(4)	F-to-F
0213108	General Chemistry Laboratory 1	0	3	1	0213107(4	F-to-F
0213132	Principles of Statistics Laboratory 1	0	3	1	02013131(4)	F-to-F

(1) "High School Mathematics "or Prerequisite Mathematics 0213098.
(2) "High School Physics "or Prerequisite Physics 0213097.
(3) "High School Chemistry" or Prerequisite Chemistry 0213099.
(4) or concurrent

Fourth: Obligatory Specialization Requirements (77 credit hours)

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Method
		Theoretical	Practical	Total		
0205113	General Chemistry 2	3	0	3	0213107	Blended
0205114	General Chemistry Laboratory 2	0	3	1	0205113	F-to-F
0213102	General Physics 2	3	0	3	0213101	Blended
0213104	General Physics Laboratory 2	0	3	1	0213102	F-to-F
0205215	Organic Chemistry 1	3	0	3	0205113	F-to-F
0205216	Organic Chemistry Laboratory 1	0	6	2	0205114 & 0205215(4)	F-to-F
0205213	Organic Chemistry 2	3	0	3	0205215 & 0205216(4)	F-to-F
0205214	Organic Chemistry Laboratory 2	0	6	2	0205213 & 0205216(4)	F-to-F
0205221	Inorganic Chemistry 1	3	0	3	0205113 & 0205215	F-to-F
0205234	Analytical Chemistry 1	3	0	3	0205113	F-to-F
0205235	Analytical Chemistry laboratory	0	3	1	0205114 & 0205234(4)	F-to-F
0205233	Analytical Chemistry 2	3	0	3	0205234	F-to-F
0205243	Physical Chemistry 1	3	0	3	0205113 & 0205251	F-to-F

(4) or concurrent

0205242	Physical Chemistry laboratory 1	0	3	1	0205114 & 0205243(4)	F-to-F
0205251	Mathematics for Chemistry students	3	0	3	0213106	F-to-F
0205252	Computer Applications in Chemistry	2	3	3	0205113 & 0205251	F-to-F
0205311	Organic Chemistry 3	3	0	3	0205213	F-to-F
0205312	Organic Spectroscopy	3	0	3	0205216	Blended
0205313	Systematic Identification of Organic Compounds Laboratory	0	6	2	0205214 & 0205311	F-to-F
0205321	Inorganic Chemistry 2	3	0	3	0205221 & 0205213	F-to-F
0205325	Inorganic Chemistry Laboratory	0	6	2	0205321	F-to-F
0205323	Organometallic Chemistry	3	0	3	0205216 & 0205321	F-to-F
0205331	Instrumental Analysis	3	0	3	0205234 & 0205216	F-to F
0205332	Instrumental Analysis Laboratory	0	6	2	0205235 & 0205331(4)	F-to-F
0205341	Physical Chemistry 2	3	0	3	0205243	F-to-F
0205344	Physical Chemistry laboratory 2	0	3	1	0205242 & 0205341(4)	F-to-F
0205345	Physical Chemistry 3	3	0	3	0205341 & 0205344	F-to-F
0205421	Chemistry of the Elements	3	0	3	0205323	Blended
0205431	Separation Methods	3	0	3	0205331	F-to-F
0205450	Research Project	1	3	2	0205312	F-to-F
0205459	Applications of Artificial Intelligence in Chemistry	2	3	3	0205252	Blended

(4) or concurrent

Fifth: Elective Specialization Requirements (09 Credit Hours)

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Method
		Theoretical	Practical	Total		
0205314	Fundamentals of Biochemistry	3	0	3	0205213 &0213109	Blended
0205416	Heterocyclic Chemistry	3	0	3	0205311	F-to-F
0205412	Reactive Intermediates	3	0	3	0205311	F-to-F
0205418	Chemistry of Natural Products	2	3	3	0205311 &0213109	F-to-F
0205419	Fundamentals of Polymers	3	0	3	0205311	F-to-F
0205424	Bioinorganic Chemistry	3	0	3	0205323	F-to-F

0205422	Industrial Inorganic Chemistry	3	0	3	0205323	F-to-F
0205423	Modern Inorganic Chemistry	3	0	3	0205323	F-to-F
0205425	Special Topics in Inorganic Chemistry	3	0	3	0205323	F-to-F
0205432	Environmental Chemistry	3	0	3	0205431	F-to-F
0205441	Surface Chemistry	3	0	3	0205345	F-to-F
0205442	Quantum Chemistry	3	0	3	0205345	F-to-F
0205443	Kinetics of Chemical Reactions	3	0	3	0205323& 0205345	F-to-F
0205444	Nanotechnology	3	0	3	0205345 &0205311	F-to-F
0205446	Forensics	3	0	3	0205331	F-to-F
0205439	Principles of Cheminformatics	2	3	3	0205344 & 0205252	F-to-F
0205436	Food Chemistry	3	0	3	0205323	Blended
0205445	Water Treatment	3	0	3	0205431	F-to-F

Advisory Plan for B.Sc. Degree in Chemistry

First Academic Year - Chemistry Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0213105	Calculus 1	3	(1)	0213106	Calculus 2	3	0213105
0213107	General Chemistry 1	3	(3)	0205113	General Chemistry 2	3	0213107
0213108	General Chemistry Lab .1	1	0213107	0205114	General Chemistry Lab. 2	1	0205113
0213101	General Physics 1	3	(2)	0213102	General Physics 2	3	0213101
	Obligatory University Requirement	3		0213103	General Physics Lab. 1	1	0213101(4)
	University Elective Requirement	3		0213131	Principles of Statistics 1	3	None
				0213132	Principles of Statistics Lab.1	1	02013131(4)
					University Elective Requirement	3	
Total		**16**		**Total**		**18**	

(1) "High School Mathematics "or Prerequisite Mathematics 0213098.
(2) "High School Physics "or Prerequisite Physics 0213097.
(3) "High School Chemistry" or Prerequisite Chemistry 0213099.
(4) or concurrent

Second Academic Year - Chemistry Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0205251	Mathematics for Chemistry students	3	0213106	0213104	General Physics Lab. 2	1	0213102
0205234	Analytical Chemistry 1	3	0205113	0205213	Organic Chemistry 2	3	0205215 & 0205216(4)
0205235	Analytical Chemistry Lab.	1	& 0205114 0205234(4)	0205214	Organic Chemistry Lab. 2	2	0205213 & 0205216(4)
0205215	Organic Chemistry 1	3	0205113	0205221	Inorganic Chemistry 1	3	0205113 & 0205215
0205216	Organic chemistry Lab. 1	2	0205215(4) &0205114	0205252	Computer Applications in Chemistry	3	0205113 & 0205251
0205243	Physical Chemistry 1	3	0205251& 0205113	0205233	Analytical Chemistry 2	3	0205234
	Obligatory University Requirement	3			Obligatory University Requirement	3	
Total		**18**		**Total**		**18**	

(4) or concurrent

Third Academic Year - Chemistry Program

The First Semester

Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0205312	Organic Spectroscopy	3	0205216
0205321	Inorganic Chemistry 2	3	0205221 & 0205213
0205331	Instrumental Analysis	3	0205234 & 0205216
0205332	Instrumental Analysis Lab.	2	0205235 & 0205331(4)
0205341	Physical Chemistry 2	3	0205243
0205242	Physical Chemistry Lab. 1	1	& 0205114 0205243(4)
	Obligatory University Requirement	3	
Total		**18**	

The Second Semester

Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0205313	Systematic Identification of Organic Compounds Lab.	2	0205214 & 0205311
0205323	Organometallic Chemistry	3	0205216 & 0205321
0205325	Inorganic Chemistry lab.	2	0205321
0205344	Physical Chemistry Lab. 2	1	0205245 & 0205341(4)
0205311	Organic chemistry (3)	3	0205213
0205345	Physical Chemistry 3	3	0205341 & 0205344
	Obligatory University Requirement	3	
Total		**17**	

(4) or concurrent

Forth Academic Year - Chemistry Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0205431	Separation Methods	3	0205331	0205421	Chemistry of Elements	3	0205323
0205459	Applications of Artificial Intelligence in Chemistry	3	0205252	0213109	General Biology 1	3	None
0205450	Research Project	2	0205312		Elective Specialization Requirement	3	
	Elective Specialization Requirement	3			Obligatory University Requirement	3	
	Elective Specialization Requirement	3			Obligatory University Requirement	3	
Total		**14**		**Total**		**15**	

Courses that Cover Fundamental Cognitive Domains for the Chemistry Program

Cognitive Domain	Course number	Course Name	Number of credit hours			Pre-requisite
			Theoretical	Practical	Total	
Organic and Biochemistry (1)	0205215	Organic Chemistry 1	3	0	3	0205113
	0205216	Organic Chemistry Laboratory 1	0	6	2	0205114 & 0205215(1)
	0205213	Organic Chemistry 2	3	0	3	0205215 & 0205216(1)
	0205214	Organic Chemistry Laboratory 2	0	6	2	0205213 & 0205216(1)
	0205311	Organic Chemistry 3	3	0	3	0205213
	0205312	Organic Spectroscopy	3	0	3	0205216
	0205313	Systematic Identification of Organic Compounds Laboratory	0	6	2	0205214 & 0205311
	0205314	Fundamental of biochemistry	3	0	3	0205213 &0213109
	0205416	Heterocyclic chemistry	3	0	3	0205311
	0205412	Reactive intermediate	3	0	3	0205311
	0205418	Chemistry of natural products	2	3	3	0205311 &0213109
	0205419	Fundamental of polymers	3	0	3	0205311
Inorganic Chemistry (2)	0205221	Inorganic Chemistry 1	3	0	3	0205113 & 0205215
	0205321	Inorganic Chemistry 2	3	0	3	0205221 & 0205213
	0205325	Inorganic Chemistry Laboratory	0	6	2	0205321
	0205323	Organometallic Chemistry	3	0	3	0205216 & 0205321
	0205421	Chemistry of Elements	3	0	3	0205323
	0205422	Industrial Inorganic Chemistry	3	0	3	0205323
	0205423	Modern Inorganic Chemistry	3	0	3	0205323
	0205424	Bioinorganic Chemistry	3	0	3	0205323
	0205425	Special topics in inorganic chemistry	3	0	3	0205323

(1) or concurrent

Analytical Chemistry (3)	0205234	Analytical Chemistry 1	3	0	3	0205113
	0205235	Analytical Chemistry Laboratory	0	3	1	0205114 & 0205234(1)
	0205233	Analytical Chemistry 2	3	0	3	0205234
	0205331	Instrumental Analysis	3	0	3	0205234 & 0205216
	0205332	Instrumental Analysis Laboratory	0	6	2	0205235 & 0205331(1)
	0205431	Separation Methods	3	0	3	0205331
	0205432	Environmental Chemistry	3	0	3	0205431
Physical Chemistry (4)	0205243	Physical Chemistry 1	3	0	3	0205113 & 0205251
	0205242	Physical Chemistry Laboratory 1	0	3	1	0205114 & 0205243(1)
	0205341	Physical Chemistry 2	3	0	3	0205243
	0205344	Physical Chemistry Laboratory 2	0	3	1	0205242 & 0205341(1)
	0205345	Physical Chemistry 3	3	0	3	0205341 & 0205344
	0205441	Surface Chemistry	3	0	3	0205345
	0205442	Quantum Chemistry	3	0	3	0205345
	0205443	Kinetics of chemical reactions	3	0	3	0205345 &0205323
	0205444	Nanotechnology	3	0	3	0205345 &0205311
Advanced application in chemistry (5)	0205252	Computer Applications in Chemistry	2	3	3	0205113 & 0205251
	0205450	Research Project	1	3	2	0205312
	0205446	Forensics	3	0	3	0205331
	0205459	Applications of Artificial Intelligence in Chemistry	3	0	3	0205252
	0205439	Principles of Cheminformatics	2	3	3	0205252 & 0205344
	0205436	Food Chemistry	3	0	3	0205323
	0205445	Water Treatment	3	0	3	0205431

(1) or concurrent

Supporting courses for the Chemistry Program that are offered by other programs in the College of Science or by other Colleges

Cognitive Domain	Course Number	Course Name	Number of credit hours			Pre-requisite
			Theoretical	Practical	Total	
Supporting Domains	0205251	Mathematics for Chemistry students	3	0	3	0213106
	0213102	General Physics 1	3	0	3	0213101
	0213105	Calculus 1	3	0	3	(1)
	0213106	Calculus 2	3	0	3	0213105
	0213101	General Physics 1	3	0	3	(2)
	0213107	General Chemistry 1	3	0	3	(3)
	0213109	General Biology 1	3	0	3	None
	0213131	Principles of Statistics 1	3	0	3	None
	0213103	General Physics Laboratory 1	0	3	1	0213101(4)
	0213108	General Chemistry Laboratory 1	0	3	1	0213107(4)
	0213102	General Physics 2	3	0	3	0213101
	0213104	General Physics Laboratory 2	0	3	1	0213102(4)
	0213132	Principles of Statistics Laboratory 1	0	3	1	0213131(4)
	0213097	Prerequisite Physics (5)	3	0	0	None
	0213098	Prerequisite Calculus (5)	3	0	0	None
	0213099	Prerequisite Chemistry (5)	3	0	0	None

(1) "High School Physics " or Prerequisite Physics 0213097.
(2) "High School Chemistry" or Prerequisite Chemistry 0213099.
(3) "High School Mathematics " or Prerequisite Calculus 0213098.
(4) or concurrent
(5) This course is marked **PASS** or **FAIL**.

Description of the Courses that Cover Fundamental Cognitive Domains of the Chemistry Program (Mandatory requirements)

Course Name: **Prerequisite Chemistry**		Course Number: **0213099**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course content provides a firm foundation in chemical concepts and principles includes : the study of change, mass relationships in chemical reactions; gases; periodic relationship among the elements; chemical bonding I: basic concepts; physical properties of solutions; and acids and bases and their solution equilibria		
Course name: **General Chemistry 1**		Course number: **0213107**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213099**		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are chemical foundations; atoms; molecules and ions; stoichiometry; types of chemical reactions and solution stoichiometry; atomic structure and periodicity; bonding: general concepts; and covalent bonding: orbitals.		
Course name: **General Chemistry Laboratory 1**		Course number: **0213108**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213107 ****		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course curriculum includes the following experiments: basic laboratory techniques; identification of a compound: chemical properties; percent water in a hydrated salt; empirical formula; limiting reactant; properties of inorganic compounds and metathesis reactions; standardization of sodium hydroxide solution and vinegar analysis.		
Course name: **General Chemistry 2**		Course number: 0205113	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213107**		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are gases; thermochemistry; spontaneity; entropy; and free energy; liquids and solids properties of solutions; chemical kinetics; chemical equilibrium and acids and bases.		
Course name: **General Chemistry Laboratory 2**		Course number: 0205114	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0205113 ****		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course experiments are bleach analysis; molar mass of volatile liquid; determination of rate law; factors affecting reaction rates; solubility product constant and common ion effect; equilibrium constant for slightly soluble salt; and analysis of KClO3 mixture.		
Course name: **Organic Chemistry 1**		Course number: **0205215**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205113**		Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are structure and bonding; polar covalent bonds; acids and bases, organic compounds: alkanes and their stereochemistry; organic compounds: cycloalkanes and their stereochemistry; stereochemistry at tetrahedral centers; an overview of organic reactions; alkenes: structure and reactivity; alkenes: structure and reactivity; alkenes: reactions and synthesis.		

Course name: **Organic Chemistry Laboratory 1**	Course number: **0205216**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite**: 0205114 & 0205215**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The laboratory experiments are melting point and boiling point determination; distillation; recrystallization; extraction; thin layer chromatography (TLC); Aspirin synthesis; nucleophilic substitution (alkyl halides); preparation of t-butyl chloride and alkenes.	
Course name: **Organic Chemistry 2**	Course number: **0205213**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205215 &0205216 ****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are benzene and aromaticity; chemistry of benzene; alcohols and phenols; ethers and epoxides; thiols and sulphides; aldehydes and ketones; carboxylic acids; and carboxylic acid derivatives and nucleophilic acyl substitution reactions.	
Course name: **Organic Chemistry Laboratory 2**	Course number: **0205214**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite: **0205213 & 0205216 ****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics include the oxidation and reduction reactions; nucleophilic addition reactions; hydration reactions; Aldol condensation reactions; esterification reactions; and the general chemical tests used for the identification of the carbonyl; alcohol; alkenes; and amines. In addition to review some experimental techniques such as: melting and boiling points determination, crystallization, extraction, and suction filtration.	
Course name: **Inorganic Chemistry 1**	Course number: **0205221**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205113 & 0205215**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are basic concepts: atoms, basic concepts: ionic compounds and bonding in polyatomic molecules.	
Course name: **Analytical Chemistry 1**	Course number: **0205234**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205113**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are errors and treatment of analytical data; gravimetric analysis; titrimetric methods of analysis; acid- base titration; precipitation titration, complex formation and oxidation reduction titrations; titration of complex systems; and introduction to electrochemistry.	
Course name:**Analytical Chemistry Laboratory**	Course number: **0205235**	NO. of credit hours:**1(3** Experimental Hrs.)
Pre-requisite: **0205114 & 0205234 ****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The laboratory experiments are calibration of volumetric glassware; statistical handling of data; gravimetric methods; neutralization titration in aqueous media (acid-base titration); application neutralization titration in aqueous media: quantitation of phosphoric acid in commercial acid; complexometric titration: titration with EDTA; precipitation titration: the Mohr's method; precipitation titration: the Volhard's method; determination of calcium by quantitative precipitation and titration; and gravimetric methods: gravimetric determination of sulfate.	

Course name: **Analytical Chemistry 2**	Course number: **0205233**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205234**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The cource topics includes (1)precipitation Titrations: Solubility Equilibria; Factors Affecting the Solubility Product Constant Value; Precipitation Reactions and Solubility Considerations; Avoiding Impurities; Controlling Particle Size; relative supersaturation; Thermogravimetric analysis; Inorganic Analysis; organic Analysis; Quantitative Calculations.(2) Electroanalytical chemical Analysis: Electric double layer; metal-solution interface; metal-metal interface; Galvanic/electrolytic cells; Nernst equation; Electrodes; Electrochemical cells; electrode potential; Titration curves; Indicators.	
Course name: **Organic Spectroscopy**	Course number: **0205312**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205216**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course content, firstly, describes the basic instrumental principles involved in the operation of the studied spectroscopic technique. Then, the methods of sample handling and preparation, finally, the students are trained to interpret useful information about the molecular composition and structure of the organic compound from the spectral data generated from the studied technique. The course topics are Infrared Spectrometry (IR), Mass Spectrometry, Nuclear Magnetic Resonance Spectrometry (1H-NMR), and Nuclear Magnetic Resonance Spectrometry (13C-NMR).	
Course name: **Systematic Identification of Organic Compounds Laboratory**	Course number: **0205313**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite: **0205214 & 0205311**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are identification of unknowns and preliminary examination; physical properties; elemental analysis; classification of organic compounds by solubility; chemical tests for functional groups; separation of mixtures; the preparation of derivatives and solving structural problems by IR, NMR and elemental analysis.	
Course name: **Inorganic Chemistry 2**	Course number: **0205321**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205221 & 0205213**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are introduction to molecular symmetry, d-block metal chemistry: general considerations, and d-block metal chemistry: coordination complexes.	
Course name: **Inorganic Chemistry Laboratory**	Course number: **0205325**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite: **0205321**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course experiments are the stabilization of a complex by Chelate effect: Effect of ligand type; Stabilization of a complex containing monodentate ligand; Effect of metal electronic structure; Stereoisomerism; Constitutional; geometrical; and optical isomers of cobalt (III) containing complexes; and identification of complexes by instrumental techniques; Conductivity and visible spectrophotometry.	
Course name: **Organometallic Chemistry**	Course number: **0205323**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205216 & 0205321**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are introduction to organometallic complexes; alkyls and hydrides; carbonyls; phosphines and substitution; pi complexes.	

Course name: **Instrumental Analysis**	Course number: **0205331**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205216 & 0205234**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are atomic spectroscopy; optical atomic absorption spectroscopy; molecular spectroscopy; optical instrumentation; applications of UV-Vis spectroscopy; infrared spectroscopy; mass spectroscopy; high performance liquid chromatography; and gas chromatography.	
Course name: **Instrumental Analysis Laboratory**	Course number: **0205332**	NO. of credit hours:**2** (**6** Experimental Hrs.)
Pre-requisite: **0205235 & 0205331 ****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The laboratory experiments are Spectrophotometric Determination of Fe(III) solution λmax, calibration curve; calculation of molar absorptivity; pH effect; refractometry; simultaneous determination of manganese and chromium ions; flame photometry; polarimetry; IR spectroscopy; potentiometry, high performance liquid chromatography; and gas chromatography.	
Course name: **Physical Chemistry 1**	Course number: **0205243**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205113 & 0205251**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	Students will explore the properties and behavior of gases, delve into the core concepts of thermodynamics such as energy; enthalpy; entropy; and free energy; and examine the principles governing chemical equilibrium.	
Course name: **Physical Chemistry Laboratory 1**	Course number: **0205242**	NO. of credit hours: **1** (**3** Experimental Hrs).
Pre-requisite**: 0205114 & 0205243 ****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The experiments are determination of the heat capacity of a calorimeter; heat of neutralization; heat of solution from solubility; freezing point depression; adsorption of acetic acid by activated carbon in aqueous medium; determination of critical temperature of phenol-water system; heating and cooling curve of sodium thiosulfate.	
Course name: **Physical Chemistry 2**	Course number: **0205341**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205243**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course covers the ideal solution and colligative properties; the ideal dilute solution; equilibrium between condensed phases; equilibrium in non-ideal systems; the basic principles of chemical kinetics including reaction rate; rate laws; activation energy; collision theory; the transition state theory; Gibbs energy and entropy of activation; heterogeneous reactions; kinetics of complex reactions; kinetics of catalysis by enzymes; kinetics of photochemical reactions. The basic theory and application of electrochemical science: general electrochemical concepts; introduction to electrochemistry; thermodynamics; electrode potentials; galvanic and electrolytic cells.	
Course name: **Physical Chemistry Laboratory2**	Course number: **0205344**	NO. of credit hours: **2** (**6** Experimental Hrs).
Pre-requisite: **0205242 & 0205341****	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The laboratory experiments are determination of the solubility product of sparingly soluble salt, dissociation constant and molar conductivity at infinite dilution of weak electrolyte by conductance measurement, determination of conductivity coefficient, rate law determination of everyday processes, halogenation of acetone in solution, catalytic decomposition of hydrogen peroxide, saponification of ethyl acetate by conductivity measurements, effect of temperature on reaction rate.	

Course name: **Physical Chemistry 3**	Course number: **0205345**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205341** & **0205344**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course covered the basic principles of (a)conductivity including electrolytic solutions; Faradays law; electrical conductance; applications and Kolwrawsh Law; conductometric titrations; transport numbers; ionic migration and Oswald Law; activity coefficient; ionic strength; and strong electrolytes theories. (b) The theoretical background of the quantum theory ; the role of photons in understanding phenomena ; wave like behavior of matter ; and how this motivates the need to replace classical mechanics by a wave equation of motion for matter.	
Course name: **Computer Applications in Chemistry**	Course number: **0205252**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205113 & 0205251**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course introduces students to the wide range of software tools and applications used in modern chemical research and industry. Students will learn how to utilize computational chemistry software, molecular modeling programs, data analysis tools, and laboratory management systems to enhance their research capabilities and streamline workflows. The course emphasizes practical skills and hands-on experience with industry-standard software	
Course name: **Chemistry of the Elements**	Course number: **0205421**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course initially discusses the major trends in periodic table elements including bonding type, physical properties, and reactivity. The course topics are periodic trends, hydrogen, the group 1 elements: the alkali metals, the group 2 elements: the alkaline earth metals.	
Course name: **Organic Chemistry 3**	Course number: **0205311**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205213**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course topics are carbonyl alpha-substitution reactions; carbonyl condensation reactions; amines and heterocycles; orbitals; and organic chemistry; and pericyclic reactions.	
Course name: **Separation Methods**	Course number: **0205431**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205331**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course aims to provide various methods for the chromatographic ways for separation of mixtures in liquid and gas phase. The course topics are chromatographic separations; gas chromatography (GC); high-performance liquid chromatography (HPLC); and miscellaneous separation methods.	
Course name: **Applications of Artificial Intelligence in Chemistry**	Course number: **0205459**	NO. of credit hours: **3 (2** Theoretical &1 Experiment Hrs.)
Pre-requisite: **0205252**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course provides an introduction to the transformative role of artificial intelligence (AI) in the field of chemistry. Students will explore how AI techniques are applied to solve complex problems in chemical research and industry. The course covers machine learning algorithms, data analysis, and computational modelling, highlighting their applications in drug discovery, materials science, and chemical synthesis.	

Course name: **Research Project**	Course number: **0205450**	NO. of credit hours: **2** Theoretical Hrs.
Pre-requisite: **0205312**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This applied research course aims to develop the student's self-learning, interpersonal skills, critical thinking and problem solving through conducting a scientific review, applied experiment. This course includes a fortnightly two-hours session to follow up on the student's progress in the research and to enable the student demonstrating, discussing and evaluating his/her achievement with peers and the department faculty members.	

** Or concurrent.

Description of the Courses that Cover Fundamental Cognitive Domains of the Chemistry Program (Optional requirements)

Course Name: **Forensics**	Course number: **0205446**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205331**	Teaching language: **English**	Offered by : Chemistry Program
Course Description	This course topic includes crime scene analysis; physical/ chemical analysis of evidence; microscopy; chromatography; hair /fiber /glass /document /fingerprint analysis; firearms; drug; toxicology; entomology; anthropology; blood (serology) and DNA analysis. Principal methods of learning include lecture, demonstration, case study analysis, forensic journal reading, forensics competitions, lab activities and experiments.	
Course Name : **Environmental Chemistry**	Course number: **0205432**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205431**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course covered the chemistry of air; water; and toxic of organic compounds (how anthropogenic activities affect this chemistry on planet Earth). This course is divided into four major parts : Atmospheric Chemistry and Air Pollution; Climate Change and Energy; Water Chemistry and Water Pollution; and Toxic Organic Compounds.	
Course Name: **Nanotechnology**	Course number: **0205444**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205345 & 0205311**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course covered the importance of the nanoparticles in industries and in our lives, classification of nanostructured and the chemical and physical properties of different nanostructured, Carbon Based Nanomaterials (Fullerenes, carbon-nanotubes and graphene); synthesis and fixtures nanoparticles and nanocolloids: synthesis and fabrication methods for nanomaterials; titanium nanotubes with and without palladium; silver and gold nanoparticles and some other fixtures; spectroscopic and microscopic tools used in nanomaterials characterizations; general industrial applications for nanoscale systems and fixtures, ; the most recent tools of nanomaterials characterization; the applications and fictionalization of nanomaterials; and nanotechnology and clean technologies.	
Course name: **Surface Chemistry**	Course number: **0205441**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205345**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course covers surface tension and its determination, kelvin and young Laplace equations, effect of temperature on surface tension and Parachor, single crystal surface, simple and complex surface structures, relaxed, reconstructed, faceted surfaces, adsorption of gas on solid surfaces, and method of determination, Frindlish, Langmuir and BET adsorption isotherms, crystal structures properties, crystal	

	lattice, type of crystals (covalent -ionic)-cubic centered face-cubic centered body, Bravais lattices, symmetry operators; elements and axis of rotation, symmetry and point group of molecules and point group of unit cells-point groups and space groups, calculating the volume of the unit cell , atomic radius , number of molecules , atomic packing, and the density, X- ray diffractions and Bragg's law, Miller indices of directions and planes-calculate interplanar d -spacing (dhkl), crystal defects and types of defects.

Course Name: **Quantum Chemistry**	Course number: **0205442**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0205345**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course introduces The basics of quantum theory; quantum mechanics and its origin; properties of wave function; solution of Schrödinger equation, a particle in a box with different one – two –three dimensions; predict the wave function equation and the energy in each case; the harmonic oscillator; Schrödinger equation of Hydrogen atom; different quantum numbers and their uses in describing the orbitals and the energy levels; molecular orbital theory and molecular structure-linear combination of atomic orbitals (LCAO); and application of molecular orbital theory on homonuclear and heteronuclear Molecules.	

Course Name: **Kinetics of Chemical Reactions**	Course number: **0205443**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323& 0205345**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This advanced course in chemical kinetics provides an in-depth study of the rates and mechanisms of chemical reactions. The course covers both homogeneous and heterogeneous kinetics, including enzyme catalysis, photochemical processes, and reaction dynamics at surfaces. Emphasis is placed on the use of mathematical models and computational methods to analyze kinetic data and predict reaction behavior.	

Course Name: **Water treatment**	Course number: **0205445**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205431**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course covers a wide range of topics, including water quality assessment, coagulation and flocculation, sedimentation, filtration, disinfection.	

Course Name: **Industrial Inorganic Chemistry**	Course number: **0205422**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course will cover the importance: availability, forms, structure and modifications of primary and manufactured inorganic compounds also the course will cover chemical industries concerning catalysis, basic principles, mechanisms, factors affecting the performance. The course will give brief ideas on distillation: batch and continuous	

Course Name: **Modern Inorganic Chemistry**	Course number: **0205423**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course provides an in-depth understanding of the principles and practices involved in modern inorganic chemistry including Advanced structure, bonding, and chemical reactivity with application to compounds of the main group and transition elements, with organometallic chemistry. Application of fundamental inorganic reactions and bonding theories and models of main group elements, coordination compounds, organometallic compounds, ionic compounds, metal clusters, inorganic polymers, inorganic catalysis, some natural in organic compounds.	

Course Name: **Heterocyclic Chemistry**	Course number: **0205416**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205311**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This capstone course aims at giving the fundamentals of chemistry of heterocyclic compounds, with an emphasis on heterocyclic systems such as Pyridine, Quinoline, Isoquinoline, Pyrans and Pyrones, Pyrrole, Furan and Thiophene. The course topics are heterocyclic chemistry: general principles, Pyridine, Benzopyridines, Pyrylium salts, Pyrans and Pyrones, Benzopyrylium salts, Coumarins, Chromones, Flavonoids, five-membered heterocycles containing one heteroatom: Pyrrole, Furan and Thiophene, Four-membered heterocycles containing nitrogen, oxygen or sulfur atom.	
Course Name: **Reactive intermediates**	Course number: **0205412**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205311**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course will cover the following topics: Introduction to reactive intermediates, definition and classification of reactive intermediates, types of reactive intermediates including: carbocations, carbanions, radicals, carbenes, nitrenes and benzynes. For each type of intermediate the course will discuss structure and stability, generation and detection, reactivity patterns, applications in organic synthesis and reaction mechanisms and importance in industrial processes.	
Course Name: **Fundamentals of Biochemistry**	Course number: **0205314**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0205213 &0213109**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course first reviews the properties of aqueous solutions and elements of thermodynamics. Then, a description of the structures and functions of proteins, nucleic acids and lipids are given. Finally, an introduction to enzymes is given with an emphasis on structure, shape, and reaction kinetics. The course topics are water: the solvent for biochemical reactions, amino acids and peptides, the three-dimensional structure of proteins, protein purification and characterization techniques, the behavior of proteins: enzymes, carbohydrates, lipids and proteins, nucleic acids: how structure conveys information.	
Course Name: **Fundamentals of Polymers**	Course number: **0205419**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205311**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course covered polymerization mechanisms; polymer structure and morphology; characterization techniques; and polymer properties. Emphasis will be placed on understanding the relationships between molecular structure, processing methods, and material properties. Practical applications in various industries, such as healthcare, materials science, and engineering.	
Course Name: **Principles of cheminformatics**	Course number: **0205439**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205344 & 0205252**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course teaches students how to use computers to solve chemical problems by integrating chemistry and informatics. Students will learn to digitally represent and store chemical data; use molecular descriptors for analysis and prediction; and study Quantitative Structure-Activity Relationship (QSAR) models; and practical applications in drug design, will be emphasized.	

Course Name: **Bioinorganic Chemistry**	Course number: **0205424**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	This course introduces the life-essential elements. The discussion then focusses on the essential metals: Their periodic properties; Lewis acid/base properties; the coordination chemistry of such metals. Biologically relevant topics to be discussed are: (i) Magnesium-an example of life evolution. (ii) Cobalt-an example on enzyme in action. (iii) Zinc- a d10 metal in enzyme action.	
Course Name: **Special Topics in Inorganic Chemistry**	Course number: **0205425**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course introduces the fundamentals of inorganic drug design based on coordination complexes such as metal center position in the d-block, oxidation state and ligand type. The discussion will be focused in coordination complexes used to treat cancer, including mechanism of action and targeting strategy.	
Course Name: **Chemistry of Natural Product**	Course number: **0205418**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205311 &0213109**	Teaching language: **English**	Offered by: Techno – Chemistry Program
Course Description	This course covered biological natural products and drugs of natural origin, including sources; principal components; structural component analysis; drug use; mechanism of action. A preliminary chapter is used to outline natural products resources; taxonomy; plant description and morphology; the role of natural products in drug discovery and development and approaches to discover new drug leads from nature.	
Course Name: **Food Chemistry**	Course number: **0205436**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0205323**	Teaching language: **English**	Offered by: Chemistry Program
Course Description	The course applies basic scientific principles to food systems and practical applications. Chemical/biochemical reactions of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed with respect to food quality.	

Description of the Courses Offered by the Basic Sciences Department and Cover the Supporting Domains of the Chemistry Program

Course Name**: General Physics 1**		Course number: **0213101**	NO. credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213097**		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers units and measurement, scalar and vector quantities, vectors, motion in one dimension, projectiles, circular motion, laws of motion and their applications, work and energy, linear momentum, collisions, kinematics of rotational motion, center of mass, torque, angular momentum, applications of static and dynamic equilibrium.		
Course Name**: General Physics Lab. 1**		Course number: **0213103**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213101 &0213097**		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers an introduction on measurements, accuracy and precision, collection and analysis of data, measurements and uncertainties, vectors: force table, kinematics of rectilinear motion, projectiles, newton's second law of motion with digital cart, force and displacement on a fixed pully, centripetal force/centrifugal force, coefficients kinetic and static friction, conservation of mechanical energy, conservation of momentum with digital-cart, simple pendulum, spring constant, moment of inertia of rigid object.		
Course Name: **General Physics 2**		Course number: **0213102**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213101**		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers the electric force, the electric field, Coulomb's law, Gauss's law, electric potential, electric potential energy, capacitance and dielectric materials, current and resistance, Ohm's law, electromotive force, electric circuits and Kirchhoff laws, the magnetic field, magnetic force acting on an electric charge, Lorentz law, sources of magnetic field, Biot-Savart law, Ampère's law, electromagnetic induction, Faraday's law, and Lenz's law.		
Course Name: **General Physics Lab. 2**		Course number: **0213104**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213102 &0213097**		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers experiments on electricity and magnetism: specific charge of the copper ion, electric field mapping and equipotential surfaces, Coulomb potential and Coulomb field of metal spheres, Wheatstone bridge, potentiometer, Ohm's law, power transfer, conversion of galvanometer to an ammeter and a voltmeter, charging and discharging of a capacitor, magnetic field of a straight conductor, Magnetic field of single coil / Biot-Savart's law with a teslameter, and the horizontal component of the Earth's magnetic field.		

Course Name**: Calculus 1**	Course number: **0213105**	NO. credit hours: **3** Theoretical Hrs.
Pre-requisite: *	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers functions and their properties, types of functions, equation of a straight line, curves of functions, average equations, limits and continuity, derivative, definition of the derivative, trigonometric functions, implicit differentiation, applications to derivatives, Rolle's theorem, mean value theorem, properties of integration, the first and second fundamental theorems, the fundamental theorem of calculus, applications to integration (area, volume, surface area, arc length).	
Course Name**: Calculus 2**	Course number: **0213106**	NO. credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213105**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers exponential and logarithmic functions, Hyperbolic functions, Inverse functions, trigonometric and hyperbolic inverse functions, Integration techniques by parts, Trigonometric substations, fractions, integration of partial trigonometric functions, and improper integrals. Sequences test, series convergence test, ratio test, comparison test, root test conditional convergence, Maclaurin and Taylor series and their convergences, power series, differentiation and integration of power series.	
Course Name**: Principles of Statistics 1**	Course number: **0213131**	NO. credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers data collection, survey, types of data, sampling techniques, data representations, measure of central location, measure of dispersion, probability, random variables and distribution, methods of counting, Independence, conditional probability, Bayes theorem, binomial distribution, normal distribution, expectations, Point estimation, interval estimation for mean, hypothesis testing for mean.	
Course Name**: Principles of Statistics Lab 1**	Course number: **0213132**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213131****	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers data representation by graphs and tables for ungrouped and grouped data, measures of central location (mean, median, and mode), measures of dispersion (range, variance, and standard deviation), probability distribution curves, binomial distribution, normal distribution, central limit theorem (CLT), Estimations of the confidence interval and hypothesis testing about the mean of one population, and correlation and regression. Statistical packages such as SPSS and Minitab are used for the above calculations.	
Course Name**: General Biology 1**	Course number: **0213109**	NO. credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This course cover chemical context of life, water and the fitness of the environment, carbon and the molecular diversity of life, the structure and function of large biological molecules, cell structure and function, membrane structure and function, introduction to metabolism, cellular respiration and fermentation, photosynthesis, the cell cycle, mitosis, meiosis and sexual life cycles, Mendel and the gene idea, and the chromosomal basis of inheritance.	

Course Name: **Mathematics for Chemistry students**	Course number: **0205251**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213106**	Teaching language: **English**	Offered by: Mathematics Program
Course Description	The course covers complex numbers, linear equations, vectors, matrices and determinants, straight-line equation and plane equation, partial differentiation, multiple integrals, vector analysis, Stoke's theorem and Divergence theorem, first-order differential equations, Fourier series of functions, and periodic functions.	
Cours Name: **Prerequisite Physics ***	Course number: **0213097**	NO. of credit hours: **0** (**3** Theoretical.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers measurement and system of units; Vectors; motion in one and two dimensions; Particle dynamics and Newton's laws of motion; Work and energy; Conservation of energy; Collisions, impulse; Conservation of linear momentum; Electric charge; Coulomb's law; Electric field; Gauss law; Electric potential: electric potential energy and electric potential of point charges; Current and resistance; Ohm's law; Kirchhoff's laws; Magnetic field: Magnetic force and concept of magnetic field.	
Cours Name: **Prerequisite Calculus ***	Course number: **0213098**	NO. of credit hours: **0** (**3** Theoretical.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers real numbers, Inequalities; Cartesian plane; Distance formula, Straight lines; Parabola; Graph of curves; Composition functions; Polynomials; Rational functions; Long division, Roots of polynomials; Exponents; Logarithms; Trigonometric functions, Limits, Continuity, Limits at infinity, Definition of derivative; Differentiation rules; Applications; chain rule; Implicit differentiation; Derivatives of logarithmic and trigonometric functions; Definite integration; Principles of integration; Fundamental theorem of calculus; Applications of integration; Area between two curves.	
Cours Name: **Prerequisite Chemistry ***	Course number: **0213099**	NO. of credit hours: **0** (**3** Theoretical.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers basic concepts in chemistry: The study of change; Mass relationships in chemical reactions, Gases, Physical periodic relationship among the elements; Chemical bonding; Physical properties of solutions; Acids, bases and their equilibria. The course emphasizes on developing the student's problem-solving skills by introducing examples on everyday examples whenever possible.	

* This course is marked **PASS** or **FAIL**

** Or concurrent.

Description of Elective University Courses Offered by the Chemistry Program

Cours Name: **Chemistry and Life**	Course number:**0205111**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **Arabic**	Offered by: Chemistry Program
Course Description	This course covered Chemistry and its importance for technology of industry; importance of metals in human life; industrial extraction of metals; alloys : properties and uses; preparation of important inorganic compounds (sodium hydroxide, chlorine, hydrogen, acids, glass, cement); chemical fertilizers : nitrogen and phosphate: preparation and uses; herbicides : types; advantages and limitations; petroleum as important energy source : its derivatives and refinery; polymers and plastics; paints; dyes and detergents; chemistry and human health : drugs; antacids; antibiotics; heart-diseases drugs and anti-cancer drugs.	