School	
Major	Bachelor of Science in Chemistry

Major Requirements			
Code	**Title**	**Credits**	**Description**
CHEM490	Modern Topics in Chemistry	2	This curricular unit aims to illustrate the importance of controlled/living radical polymerization techniques as NMP, ATRP, and RAFT in the synthesis of complex macromolecular architectures with high value. In this sense, the kinetics of conventional radical (co)polymerization is introduced as an extension for the synthesis part from the industrial chemistry course. A comparison between conventional and living radical (LR) polymerizations is introduced to show the limitation of the former method and the importance of the latter one. Finally, the mechanisms, monomers, conditions, and macromolecular design of the three living radical polymerization techniques (ATRP, and RAFT) are explained in depth.
CHEM465	Environmental Chemistry	3	This course aims to introduce the principles and chemical processes that control chemical reactions in natural systems. Students will be introduced to the source, fate, and reactivity of compounds in natural and polluted environments. Emphasis will be placed on the chemistry of air, water, and toxic organic compounds as well as how anthropogenic activities affect this chemistry on planet Earth. Specifically, we will examine the sources, reactions, transport, effects, and fates of chemical species found in air and water. Environmental issues that will be discussed include stratospheric ozone depletion, causes and effects of global warming, pollution and treatment of water sources.
CHEM430	Instrumental Chemistry	3	This course covers 10 topics. It is related to the instrumental analytical techniques
CHEM420	Industrial Chemistry	3	This industrial chemistry course deals with the industrial processes used in the transformation of raw materials from oil, gas, soil, or biomass into the production of chemicals and their secondary commercial products (plastics, cement, glass, polymers etc.). The course will be divided into two major sections: Organic and Inorganic industrial chemicals and their derivatives. In the organic part light will be shed on synthetic organic chemicals (products derived from naturally occurring materials as petroleum, natural gas, and coal), petrochemicals, synthetic resins and plastics, and finally a glance on the chemistry of adhesives. On the other hand, the Inorganic part focuses on inorganic chemicals and their derivatives as glass and cement.
CHEM410	Structure Determination of Compounds	3	This course aims to teach Chemistry undergraduate students spectroscopic methods of structure determination. It is a useful tool for the students which will engage them in research. It will help the students to interpret spectra, and also to present the basic theoretical concepts in spectroscopy.
CHEM350L	Organic Chemistry Lab III Lab	1	The Organic III chemistry lab is a culmination of the earlier organic chemistry labs taught. In this lab students will be introduced to conducting chemical syntheses of organic molecules using acquired knowledge from the course. In this sense, the students will implement old organic lab techniques as purification methods such as recrystallization, extraction, distillation, and chromatography in the synthesis of molecules. Assessment of the final obtained molecules (as purity) will be evaluated, theoretically, in comparison with literature databases as nuclear magnetic resonance (NMR), infrared (IR), or ultraviolet-visible (uv-vis) spectroscopies.

CHEM400	Inorganic Chemistry II	3	This course is an application to modern inorganic chemistry. It builds up on the concepts discussed in CHEM370 to focus on the study of coordination chemistry, a central part of inorganic chemistry. It introduces coordination compounds, their naming and structural features. It then elaborates towards d-metal transition complexes and their electronic structures, magnetic properties and reactivity; and finishes with an overview about organometallic chemistry. The f-metal complexes, properties and trends of selected groups of elements are also discussed within the course.
CHEM350	Organic Chemistry III	3	This course is designed to build upon the concepts learned in sophomore organic courses. CHEM350 focuses on understanding the structure and reactivity of organic molecules. The course will be divided into three major topics. The first two parts will deal with the mechanistic aspect of ionic molecular rearrangements and pericyclic reactions and their applications. The final part of this course will be focused on modern techniques in Organic synthesis, based on the disconnection approach.
CHEM480	Senior Project in Chemistry	3	CHEM480 is expected to provide the opportunity for independent undergraduate research. The students enrolled in this course will learn how to read papers, books, follow the citations, devise hypotheses, analyze the results of their experiments, and present their results and readings to others in the written and oral forms.

Core Requirements			
Code	**Title**	**Credits**	**Description**
MATH210	Calculus II	3	This is the second course in the Calculus sequence. The course material includes logarithmic, exponential, and trigonometric functions, their inverses and their derivatives, integration techniques, improper integrals, sequences, infinite series, tests of convergence, alternating series, power series, polar coordinates and its application.
PHYS250	Thermodynamic and Waves	3	This course is designed to provide an introduction to thermodynamics, fluids and waves. Students will familiarize themselves with the concepts of simple harmonic motion, wave motion and superposition of waves. Then, both fluid statics and fluid dynamics will be discussed. In the last part on thermodynamics, the notions of temperature, heat and calorimetry will be introduced followed by the ideal gas law.
PHYS280	Electricity and Magnetism	3	This course provides an overview of electromagnetism. Students will familiarize themselves with the concepts of electrical fields, Gauss Law, electrical potential difference, electrical potential energy, current, Kirchhoff's laws, DC circuits, magnetic fields, Ampere's Law, Faraday's law. Finally, all topics studied will be summarized by Maxwell's equations. Modern applications of the material will be discussed, and important problem solving strategies and skills will be developed.
MATH270	Ordinary Differential Equations	3	This course provides an introduction to ordinary differential equations and their applications. The contents of this course include first order equations, separable, exact, and linear equations, second and higher order differential equations, systems of differential equations, series solutions, and Laplace transformation.

MATH245	Statistics for Health Sciences	3	“Introduction to Epidemiology & Biostatistics” is an integrated course that introduces students to the basic principles of Epidemiology and Biostatistics. The course covers the basic principles of research design and the statistical methods and tools used in quantitative data analysis in the domain of health sciences. The first part of the course focuses on epidemiology and covers the design of epidemiological studies, epidemiological measures of the frequency of vital events (health, disease, disability and death), measures of association and impact of the risk factors on health events in human populations and the types of bias in epidemiological studies. It also covers the issues of sampling and the methods of summarizing and presenting health-related data. The second part of the course focuses on biostatistics and covers the methods of data collection and analysis, probability distribution of different outcomes. It also covers the concept of estimation (confidence intervals), hypothesis testing & statistical significance, correlation, performance characteristics of diagnostic tests, and practice in critical reading of medical literature. The course also includes a practical part in the laboratory on the basics of the performing statistical analysis of data using the SPSS statistical program.
CHEM370L	Inorganic Chemistry I Lab	1	CHEM 370L Inorganic Chemistry Laboratory cover experiments related to the topics covered in CHEM 370 Inorganic Chemistry II course. The main purpose of this laboratory is to provide the students an appreciation for the synthesis and analysis of variety of inorganic complexes. Transition metals will play a central structural role in all chemical systems that we will synthesize.
CHEM370	Inorganic Chemistry I	3	This course will focus on laying the fundamental principles of Inorganic chemistry. The goal of this course is to provide knowledge on some fundamental concepts such as atomic structure, bonding, trends in periodic properties, molecular symmetry and its relationship to IR spectroscopy, acidic properties of aquated cations and redox chemistry.
CHEM360	Physical Chemistry II	3	This course aimed to provide the students with an introduction to the principles of quantum chemistry and its application in photochemistry, which relates to the interactions between matter and photons of visible or ultraviolet light and the subsequent physical and chemical processes. We will cover in this course quantum mechanics including classical mechanical treatment of the simple harmonic oscillator, black body radiation, photoelectric effect, Compton’s effect, de Broglie relation, the Heisenberg uncertainty principal, derivation and solutions of Schrödinger equation for several simple systems with some chemical applications. Also, we will shed light on the basic principles and concepts of photochemistry; Jablonski diagram; photochemical reaction kinetics and mechanisms.
CHEM310L	Physical Chemistry I Lab	1	CHEM 310L is a Laboratory course to teach the students several common chemistry techniques related to the topics covered in the physical chemistry course CHEM 310. This laboratory course is for students with good aptitude for testing physical properties. The main purpose of this laboratory is to provide the students with a practical experience in exploring interesting areas of physical chemistry to understand the properties of matter.

CHEM310	Physical Chemistry I	3	This course will cover mostly thermodynamics and kinetics. The laws of thermodynamics will be applied to practical problems of reactivity. Examples of application to biological systems will be emphasized. Reaction rates for simple reactions (first order and second order) will be derived, and the link between reactivity and thermodynamic quantities will be given.
CHEM300L	Organic Chemistry Lab	2	CHEM300L is a laboratory course to teach the students several common organic chemistry techniques. Emphasis is placed on experimental precision and accurate results as well as safe laboratory procedures. This laboratory course is for students with good aptitude for synthesis in organic chemistry and who want to learn the preparation, isolation, and identification of organic compounds. Students will have also the opportunity to explore interesting areas of organic chemistry and work more independently on the laboratory.
CHEM300	Organic Chemistry II	3	**Course description** This course will continue the study of the fundamental principles of Organic chemistry started in CHEM 250. We will analyze in depth the theory of structure/activity relationship of conjugated systems and aromatics and their reactions such as electrophilic and nucleophilic aromatic substitution. The chemistry and properties of other functional groups such aldehydes, ketones, carboxylic acids and amines and their derivatives. Retrosynthetic analysis and detailed mechanistic aspects will be also covered.
CHEM260L	Analytical Chemistry Lab	1	CHEM 260L is a laboratory course that emphasizes the application of topics covered in the CHEM 260 course. It introduces students to several common analytical techniques used to quantify analytes of interest in samples related to everyday life via acid-base titration, EDTA complexometric titration, redox titration, spectrophotometry and electrochemistry. Students will have the opportunity to conduct experiments, observe, search for informations, analyze and criticize statiscally their own analytical chemistry results.
CHEM260	Analytical Chemistry	3	This course intends to provide students with the necessary background for understanding the fundamental aspects of chemical equilibrium in aqueous media by focusing on a range of complex systems including solubility, acid/base, complex formation and electrochemistry. The scientific data obtained and findings will be evaluated by statistical methods. Moreover, in this course, we will briefly introduce a wide range of separation techniques (spectroscopy, chromatography...) to gain hands-on experience in the laboratory.
CHEM250	Organic Chemistry I	3	**Course description**: This course will focus on laying the fundamental principles of Organic chemistry. We will cover the theory of chemical bonding, molecular structure and physicochemical properties in organic chemistry. We will analyze in depth the concepts of acidity and basicity, inductive effect and resonance theory. Stereochemistry and nucleophilic substitution (S_N1,S_N2, E1 and E2) concepts and applications will be covered in details. These principles will be applied to the chemistry of alkanes, alkyl halides, alcohols, ethers and alkenes in the first semester of organic chemistry
CHEM200L	General Chemistry Lab	1	This course lab covers the principles of general chemistry with emphasizing on laboratory applications to all concepts covered in the general chemistry course as well as preparing students to the lab work. Moreover, in this course lab, you will be introduced to the world of chemistry in terms of preparing solutions, experimenting and analyzing collected data. You will also have the chance to become familiar with lab material and equipment, learn enough about chemical substances, storing and mixing material as well as their applications in the chemical and pharmaceutical fields.

CHEM200	General Chemistry	3	This course is a first semester course, intended for students who desire to acquire the basic principles in chemistry. The emphasis of the course will be on the fundamental principles of general chemistry, which include terminology, qualitative concepts and quantitative skills. The general topics included in this course are: Quantum Theory of the Atom; Electrons and Periodicity; Bonding; Molecular Geometry; Hybridization; Acid/base Chemistry; Kinetics and reactions mechanism and Solubility and Complex ion equilibria.
BMKT300	Marketing Theory and Principles	3	This course is designed to serve as an introduction to the basic principles of Marketing, theories, and practices, and the application of these practices. By examining the present Marketing system from a managerial point of view, and having a current examples component, this course will help emphasize the Marketing principles in today's business world, taking an integrated and strategic view of formulating and implementing a coherent and competitive "Marketing Mix". Beyond traditional Marketing concepts and practices, today's marketers have added a host of new-age tools for engaging consumers, building brands, and creating customer value and relationships. Marketing more than ever is the business function that identifies customer needs and wants, determines which target markets the organization can serve best, and designs appropriate products, services, and programs to serve these markets. It is a philosophy that guides the entire organization towards understanding, serving, and satisfying consumer needs. The goal of Marketing is to build value-based relationships with customers, in conjunction with other internal and external business units. The end-result is gaining market leadership. As a result, it will help students to develop the understanding and skills necessary to become successful marketers. Marketing Theory and Principles is not just about textbook learning, rather, it challenges students to use their critical and creative skills in all aspects of Marketing, not just those covered in this course.

General Education Requirements			
Code	**Title**	**Credits**	**Description**
ENGL251	Communication Skills	3	Workplace Occupational Writing is an advanced interdisciplinary writing course emphasizing workplace and technical communication and editing appropriate to diverse professions. It incorporates practice and study of selected types of discourse employed in professional writing situations, preparing students for different systems of writing in their professional lives. Examples from the writing of workplace professionals are analyzed and used as models to demonstrate the transition from academic to professional writing.
ENGL201	Composition and Research Skills	3	This course builds upon the skills acquired in pre-requisite courses mainly ENGL 151 to further develop students' critical thinking and academic writing competencies. Students will read and respond to a variety of texts from different disciplines and produce a research paper using analytical and critical skills in response to texts.

CULT200	Introduction to Arab - Islamic Civilization	3	ØªÙÙØ«ÙÙ Ø§ÙØØ¶Ø§Ø±Ø© Ø§ÙØ¹Ø±Ø¨ÙØ© Ø§ÙØ¥Ø³ÙØ§ÙÙØ© ÙØ§ØØ¯Ø© ÙÙ Ø£ÙÙ Ø§ÙØØ¶Ø§Ø±Ø§Øª ÙÙ Ø§ÙØªØ§Ø±ÙØ® Ø¨ÙØ§ Ø£ÙØ¬Ø²ØªÙ ÙÙ Ø¥Ø¨Ø¯Ø§Ø¹Ø§Øª Ø¹ÙÙÙØ© ÙØ«ÙØ§ÙÙØ© ÙØØ¶Ø§Ø±ÙØ© ØªØ±ÙØª Ø£Ø«Ø±ÙØ§ Ø§ÙØ¹Ø¸ÙÙ ÙÙ ØªØ§Ø±ÙØ® Ø§ÙØ¨Ø´Ø±ÙØ©. ØªÙØ´ÙÙ ÙØ°Ù Ø§ÙÙØ§Ø¯Ø© Ø§ÙØ¯Ø±Ø§Ø³ÙØ© ÙÙØ¯ÙØ©Ù Ø£Ø³Ø§Ø³ÙØ© ÙÙØªØ¹Ø±Ù ÙÙ Ø¹Ø±Ø¨Ù Ø¹ÙÙ ØªØ§Ø±ÙØ® ØØ¶Ø§Ø±ØªÙØ ÙØ§ ÙÙÙÙØªØ®Ø± Ø¨ÙØ§ ÙØØ³Ø¨Ø Ø¨ÙÙ ÙÙÙØ¬Ø¹Ù ÙÙÙÙØ§ ØØ§ÙØ²ÙØ§ ÙØ³ØªÙÙØ¶ Ø¨ÙÙ ÙØ§Ø¨ÙÙÙÙØ§ØªÙ ÙÙÙØ¯Ø±Ø§ØªÙ Ø§ÙØ¹ÙÙÙØ© Ø§ÙÙØ§ÙÙØ© ÙØ¥Ø¹Ø§Ø¯Ø© Ø§ÙØ§Ø³ØªÙÙØ§Ø¶ Ø§ÙØØ¶Ø§Ø±Ù. ÙØªØØ±Ù Ø§ÙÙØ§Ø¶Ù ÙÙÙØ§ Ø¯ÙÙ Ø´Ø¹ÙØ±Ù ÙØ§Ø¹Ù ÙÙÙÙØ§Ø Ø¹ÙÙ Ø£ÙÙ ÙØ°Ø§ Ø§ÙÙÙÙØ±ÙØ± Ø§ÙØ¯Ø±Ø§Ø³Ù ÙØØ§ÙÙ Ø£ÙÙÙ ÙØ³ØªØ«ÙØ± Ø§ÙÙØ¹Ù Ø§ÙØØ¶Ø§Ø±Ù ÙØ§ÙØ«ÙØ§ÙÙ Ø¹ÙØ¯ Ø§ÙØ·ÙØ§Ø¨ Ø§ÙØ¹Ø±Ø¨Ø ÙÙØ³ØªÙÙØ¯ ÙÙÙØ°Ø§ Ø§ÙÙØ®Ø²ÙÙ ÙÙØµÙØ¹ Ø£ÙÙÙÙÙØ§ Ø¬Ø¯ÙØ¯ÙØ§ ÙÙÙÙØ³ØªÙØ¨Ù.
CSCI200	Introduction to Computers	3	The course aims at making students competent in computer-related skills. It is supposed to develop basic computer interface knowledge by providing an overview of managing folders and files, opening a start menu, and hands-on practice on typical software applications such as Word, Excel, and PowerPoint. The student will learn how to use the new features of Microsoft Office 2017, mainly Word documents, Excel spreadsheets, and PowerPoint presentations. Moreover, the course aligns with the Cisco Networking AcademyÂ® Get Connected course, which helps students understand how to connect to the Internet.
ARAB200	Arabic Language and Literature	3	ØªØªØ£ÙÙ ÙØ§Ø¯Ø© Ø§ÙÙØºØ© Ø§ÙØ¹Ø±Ø¨ÙØ© ÙØ¢Ø¯Ø§Ø¨ÙØ§ ÙØºÙØ± Ø§ÙÙØªØ®ØµØµÙÙ ÙÙ Ø«ÙØ§Ø«Ø© Ø£ÙØ³Ø§ÙØ Ø£ØØ¯ÙØ§ ÙØªÙØ§ÙÙ ÙØ¨Ø§ÙØ¯Ø±ÙØ³Ø§Ù Ø£Ø³Ø§Ø³ÙØ© ÙÙ Ø§ÙÙØØ ÙØ§ÙØµØ±Ù ÙØ§ÙØ¨ÙØ§ØºØ©. ÙØ§ÙØ«Ø§ÙÙ ÙØªÙØ§ÙÙ ÙØ¨Ø§ØØ« ÙÙ Ø§ÙØ£Ø¯Ø¨ ÙØ§ÙØªØÙÙÙÙ. Ø£ÙØ§ Ø§ÙÙØ³Ù Ø§ÙØ«Ø§ÙØ« ÙÙØ¹Ø§ÙØ¬ Ø¨Ø¹Ø¶ ØªÙÙÙØ§Øª Ø§ÙØªØ¹Ø¨ÙØ± ÙØ§ÙØªÙØ§ØµÙ.