

School	School of Arts & Science
Major	Bachelor of Biochemisrty

General Education Requirements			
Code	Title	Credits	Description
ARAB200	Arabic Language and Literature	3	تتألف مادة اللغة العربية وآدابها لغير المتخصصين من ثلاثة أقسام، أحدها يتناول دروساً أساسية في النحو والصرف والبلاغة. والثاني يتناول مباحث في الأدب والتحليل. أما القسم الثالث فيعالج بعض تقنيات التعبير والتواصل.
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 Academy® Get Connected course, which helps students understand how to connect to the Internet.
CULT200	Introduction to Arab - Islamic Civilization	3	تُمثّل الحضارة العربية الإسلامية واحدة من أهم الحضارات في التاريخ بما أنجزته من إبداعات علمية وثقافية وحضارية تركت أثرها العظيم في تاريخ البشرية. تُشكّل هذه المادة الدراسية مقدّمةً أساسية ليتعرف كل عربي على تاريخ حضارته، لا ليفتخر بها وحسب، بل ليجعل منها حافزاً يستنهض به قabiliّاته وقدراته العلمية الكامنة لإعادة الاستنهاض الحضاري. يتحرك الماضي فينا دون شعورٍ واعٍ منّا، على أنّ هذا المُقرّر الدراسي يحاول أن يستثير الوعي الحضاري والثقافي عند الطلاب العرب، فيستفيد من هذا المخزون ليصنع أفقاً جديداً للمستقبل.
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.
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.

Core Requirements			
Code	Title	Credits	Description
BIOC250	Biochemistry I (General)	4	The study of human biochemistry describes how the body works, and provides a basis for understanding what can, and often does, go wrong. This course aims at providing a concise coverage of the general principles of biochemistry. It covers the metabolism of proteins, lipids and carbohydrates, the synthesis of different macromolecules in cells, the reactions they undergo, the substances produced (e.g. hormones) and, their function and fate. The course also touches upon some diseases caused by enzymes deficiencies.
BIOL200	General Biology I	3	This course aims to familiarize the student with the organization and classification of living systems. The covered topics include mainly the cell structure and function, cell division, cell biochemistry, cellular respiration, DNA structure and protein function, as well as animal development and classification. This course has a separate one credit-laboratory component.
BIOL200L	General Biology I Lab	1	General Biology I lab introduces students to basic techniques and safety practices in the laboratory; reinforcing the concepts learned in General Biology I lecture. It provides hands-on experience of some of the concepts discussed in the latter course.
BIOL275	Cell and Molecular Biology	3	This course focuses on major biological principles and concepts related to cellular and molecular biology with emphasizing on the structural organization and function of different cellular constituents, including the organization and trafficking along the endomembrane system, the interaction and communication between cells and with their environment, the importance of the cytoskeleton as well as current techniques in cell and molecular biology. The course also includes a brief study of cancer.
BIOL275L	Cell and Molecular Biology Lab	1	This course introduces students to current laboratory techniques applied in cellular and molecular biology. Practical information related to the cellular structures and functions are delivered with an emphasis on the molecular perspective. This course is designed for students intending to major in science and to expand their laboratory experience with current molecular techniques.

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.
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.
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
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.

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 statistically their own analytical chemistry results.
CHEM300	Organic Chemistry II	3	<p>Course description</p> <p>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.</p>
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.
PHYS205	General Physics for Scientists	3	This course introduces students to classical mechanics, thermodynamics, waves, and basic electricity. Topics include motion in one-dimension, angular motion, temperature, heat, sound waves, mirrors, resistance, and capacitors. Emphasis is placed on developing problem-solving skills and applying physics concepts to real-world scenarios.

Major Requirements			
Code	Title	Credits	Description
BIOC350	Biochemistry II (Intermediary)	3	<p>This course covers different topics of recent Biochemistry research with emphasis on the protein synthesis mechanisms and machinery in both Eukaryotes and Prokaryotes and protein sequencing. Moreover, in this course, you will be introduced to the world of enzymes, the biological catalysts with remarkable properties that sustain life, so as to develop an understanding of enzyme kinetics, mechanism of enzyme action and their regulation. In addition, you will get to know how cholesterol and porphyrin are synthesized, and how xenobiotics are metabolized in your body and the diseases related to them. You will also learn about the different types of the reactive species that have direct impact on human health, and the different types of antioxidants fighting them.</p> <p>Also, you shall learn how signal transduction occurs through a highly regulated cascade of events inside cells.</p>
BIOC350L	Biochemistry II Lab	1	<p>This lab course provides experience with techniques of broad use in biochemistry. You will have the chance to become familiar with lab materials and apparatus, and it prepares you to perform experiments independently. In this lab, we emphasize on the precision and accuracy while experimenting. Moreover, you will be introduced to the world of biochemistry in terms of preparing solutions, experimenting and interpreting the collected data.</p>
BIOC400	Biochemistry III (Protein Structure & Function)	3	<p>An advanced course emphasizing topics such as chemical catalysis, enzyme mechanism, receptors, channels, antibodies, and other functional proteins.</p>
BIOC405	Enzymology	3	<p>This course provides students with a thorough foundation of theoretical and practical approach to understand some functional mechanisms of the active centers of the enzymes with emphasis on experimental methods for enzyme isolation, purification, and measuring activities and kinetics of proteins.</p>

BIOC445	Biotechnology	3	Students will learn many of the basic tools used in biotechnology today including techniques involved in DNA manipulation, cloning, molecular diagnostics, and sequence information analysis. Much of this course is an introduction to basic molecular biology techniques. Students will also learn how these techniques are applied in many exciting fields of research such as molecular diagnostics, therapeutics, gene therapy, genomics, and proteomics. The ethical implications of selected topics will be discussed.
BIOC450	Advanced Lab Techniques in Biochemistry	2	This lab course provides a working knowledge of biochemical techniques and the use of these techniques in different fields. The subjects cover a broad range of laboratory techniques used in biochemistry and molecular biology research laboratories through both lectures and laboratory experience. Lectures will cover the use of modern techniques used in biochemistry and molecular biology and experimental design
BIOC485	Modern Topics in Biochemistry	3	In this course, current reviews of the selected topics will be provided prior to the session date. This course will have a Journal club format, where each student is required to prepare and present an oral discussion of each of the selected articles, i.e., after an article is assigned, all students will come to class prepared to explain any section of that article.
BIOL360	Human Physiology & Anatomy	4	This course is designed to teach students human physiology and anatomy. Physiology is the study of the process or function of living things. The major goals of physiology are to understand the response of the body to stimuli and understand how the body maintains conditions within homeostasis in various environmental conditions. The study of physiology consists of many different levels including cell physiology, organ physiology and systemic physiology. Students will be exposed to all of these levels starting at the cellular level and eventually moving up to the system level. Physiology and anatomy are closely related subjects. Anatomy is the scientific discipline that investigates body structures. Often to fully appreciate the physiology of a given system it is necessary to first examine its anatomy. A true understanding and appreciation of physiology can only occur if structure and function are concurrently learned.

BIOL360L	Human Physiology & Anatomy Lab	1	This lab deals with the structure of the human body. It includes the study of tissues, skeletal, muscular, nervous, and cardiovascular systems. It is presented using microscopic slides, human skeletal models, anatomical models, drawings, and dissections.
BIOL365	Genetics	3	This course introduces to students recent advances in the molecular genetics field such as the study of the molecular structure and function of genes and the regulation of gene expression of prokaryotic and eukaryotic genes in a genome. This course examines as well the genomes of eukaryotes including how genomes are mapped and sequenced, the function of the genome and ethical issues arising from genomic information. Covered aspects include gene therapy, genetic disorders, the study of mutations and their resulting phenotypes, genetics of cancer, genetic screening, genetic engineering and the human genome.
BIOL385	Microbiology	3	This course covers principles of microbiology with emphasizing on the diversity and structural characteristics of microorganisms, impact of microbes on everyday life and the role of microbes in the host-pathogen interactions. Moreover, in this course, you will be introduced to the world of microbiology in terms of isolation, identification and classification. Also, you will have the chance to discover examples of different groups and species of microorganisms that have direct impact on human health, mechanism of causing diseases and the beneficial effects on the biotechnology sector as applications in the food industry.
BIOL385L	Microbiology Lab	1	Microbiology laboratory is a two hours a week laboratory course with experiments in microbial culture, staining techniques, disinfection, and sterilization. Isolation of bacteria from mixed cultures. Use various metabolic reactions in the identification and classification of organisms.
BIOL490	Seminar	1	The aim of this course is to tutor students to present a scientific topic and to give them practice speaking in front of an audience through the delivery of a professional seminar and to observe and listen to how scientific research is presented.

BMED450	Clinical Chemistry	3	The course introduces students to the principles and procedures of various tests performed in Clinical Chemistry. It presents the biochemical and physiological basis for tests, the principle and procedure for the test, and the clinical significance of the test results, including quality control and normal values. It also includes basic chemical laboratory technique, chemical laboratory safety, electrolytes and acid-base balance, proteins, carbohydrates, lipids, enzymes, metabolites, therapeutic drug monitoring or substance abuse.
BMED450L	Clinical Chemistry Lab	1	Performance of laboratory procedures necessary to function in a clinical chemistry laboratory. Lab sessions will allow students to properly perform all tests with proper understanding of the principle and procedure, and clinical significance of the test results.
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.
CHEM440	Advanced Physical Chemistry	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_ 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.