Course Descriptions for the Undergraduate Biology Program 2020

1. University Required Courses

ADM 105 Introduction to Information Technology (3 credits)

This course aims to give the students general knowledge about microcomputers and their applications which can be used later in their field of study. These applications are: word processing, computer presentation, spreadsheet and the Internet/Communication concept.

LIT 105 Arabic Civilization (3 credits)

This course introduces the overall concepts of civilization and the most important factors that contributed to the emergence of Islamic civilization. It also encompasses the main characteristics of the Islamic civilization with particular focus on the human dimension. Manifestations of Islamic civilization in policy, management, economy, society, and sciences are emphasized; topics discussed include: the Caliphate, the Ministry, the Emirate, tax calculations, the judiciary, the mandate of grievances, the police, government bureaus, the treasury, mail department, the army, the navy, women's rights and contributions, intellectual life, sciences, technological manifestations, and others. The impact of Islamic civilization in the European Renaissance and the reasons for the decline of civilization and ways to address them are also discussed.

EDU105 Introduction to Sociology (3 credits)

يتناول المقرر: تعريف علم الاجتماع وعلاقته بغيره من فروع المعرفة ,مفهومه,أهميته, فروعه وأبحاثه. علاقته بالفلسفة والتاريخ والجغرافيا وعلم النفس والاقتصاد والسياسة والقانون والأديان واللغة. المجتمعات والجماعات البشرية, مكونات النظم الاجتماعية, عمليات الضبط الاجتماعي, مفاهيم المراكز والأدوار الاجتماعية, العمليات والمتغيرات الاجتماعية, الظواهر الاجتماعية والمشكلات والعوامل المؤثرة في الظواهر الاجتماعية.

LIT 110 Arabic Language I (3 credits)

The primary aim of this course is to familiarize the students with correct writing styles, to avoid linguistic and spelling errors, to use proper punctuations, and to master various correspondence styles. The course also discusses the main principles of Arabic grammar through selected texts, spelling rules, writing paragraphs about subjects related to the selected texts, summary techniques, punctuations, rules of number spelling, common linguistic errors, titles, Curriculum Vitae editing techniques, methods of writing minutes of meetings, and administrative correspondences.

LIT 120 English Language I (3 credits)

This is a study skills course that aims at developing potential teacher's proficiency in the skills of test taking, studying, word attacking, paraphrasing, restating and handwriting.

2. Faculty and Major Required Courses

PHY101 General Physics (3 credits)

The purpose of this course is to give students, primarily those in the field of computer science and biochemistry, a general overview of mechanics, electricity, electronics, thermodynamics and modern physics, with emphasis on examples and applications in modern technology fields. At the end of this course, the student will have good knowledge of how a scientist or engineer makes use of physics concepts to contribute to technological advancement and impact the society.

BIO131 General Biology (3 credits)

General Biology is designed to provide the fundamentals of biological science. This course emphasis and covers the following topics: embryology of the vertebrates and the invertebrates, animal and human development and reproduction, vertebrate physiology and ecology. In addition it covers general chemistry and biochemistry of the cell, cell structure and function, origin and evolution of living things, molecular and organismal genetics. Upon completion, students should be able to demonstrate understanding of life at the molecular and cellular levels as well as developmental and environmental level. This course is intended for students majoring in biology or for non-biology majors who wish to take advanced biology courses.

BIO131 General Biology Lab (1 credit)

Laboratory exercises reinforce lecture topics. In addition to laboratory safety, it includes microscope techniques as well as developing laboratory skills such as instrumentation.

STAT156 Principles of Biostatistics (2 credits)

Statistics is applied in a wide range of topics in biology. The science of biostatistics encompasses the design of biological experiments, especially in medicine and agriculture; the collection, summarization, and analysis of data from those experiments; and the interpretation of, and inference from, the results. Students will focus in this course on descriptive statistics including sampling, graphical and tabular summary of data, measures of location, measures of variability, regression and correlation, in addition to probability.

BIO160 Cell Biology (3 credits)

This course introduces the student to the cell as a unit of structure of all living organisms. It includes: cell theory, biodiversity and classification of living things, plant cell wall and plasmodesmata and bacterial cell wall, structure and functions of cells and cellular organelles, Cell cycle and mechanism of cell division, cellular respiration and energy transformers, chromatin and DNA structure, function and packaging, cellular junctions. It also includes an introduction to viruses, prokaryotes, protista and fungi.

BIO165 Anatomy (2 credits)

This course examines the basic concepts of structure and function of the human body. There are nine systems in the human body. This course covers the processes of skeletal, muscular, cardiovascular, respiratory, nervous, endocrine, digestive, urinary and reproductive systems. The objective is to grossly pinpoint the location and function of any organ or tissue within human corps.

CHM165 General Chemistry I (3 credits)

This course targets to teach students the basic principles of general chemistry. The course will cover the fundamental aspects of matter and measurements, stoichiometry, and electronic structure of atoms; the periodic table properties, chemical bonding; molecular geometry; intermolecular forces; thermochemistry and gaseous state.

CHM165L General Chemistry I Lab (1 credit)

This laboratory aims to familiarize students with the laboratory environment and to introduce them to the proper and safe way of running an experiment. This course consists a theoretical and an experimental part. Students will be able to know hand skills, to illustrate theory, to promote simple scientific methods of thoughts and to interpret experimental data.

BIO170 - General Zoology I (3 Credits)

This 3-credit course is designed as an overview of the field of zoology. The course deals with animals and animal life including the classification, relationships, structure, and function of major animal phyla. Special emphasis is on morphology and systematics of both vertebrates and invertebrates. Reproduction, physiological processes, habits, behavior and distribution are also covered.

BIO175 - Histology (3 Credits)

Lecture topics, laboratory experiences and class discussions incorporate the basic topics in tissue anatomy, organization and histochemistry of vertebrates emphasizing mammalian histophysiology. Thus, this course consists of the study of different major tissues: epithelial, connective, cartilage, bone, muscular, and nervous tissue. Students will use various techniques of preparing plant and animal tissues by sectioning and staining for microscopic study in the laboratory.

BIO180 - General Botany (3 Credits)

This course features major plant groups and emphasizes plant life cycles, anatomy, morphology, taxonomy, biological contributions, and development. It also describes and recognizes the distinguishing characteristics of diverse groups. Topics also cover economically important plant products, and medicinal and poisonous plants. At the end of this course, students will be able to explain the importance of botany as a past, present, and future science.

BIO180L - General Botany Lab (1 Credit)

This laboratory work demonstrates field skills required for the examination and identification of plant tissues and specimens.

ENV201 - Environmental Science (3 Credits)

Application of biology, geology, hydrology to environmental issues. Addressing environmental problems from the standpoint of ethics, risk, and scientific and social feasibility. Emphasis on agricultural systems and natural resources.

BIO215 - Physiology (3 Credits)

This course examines the basic physiological and biochemical processes that determine and govern plant function. Topics include photosynthesis, mitochondrial metabolism, energetics, transport systems, water relations, cell walls, phytohormones, gene expression, and selected aspects of secondary plant metabolism. The laboratory work features experiments selected to demonstrate and reinforce important principles discussed in lecture. Topics include plant physiology: nutrition, enzymology, photosynthesis, respiration, transpiration, plant hormones, and seed germination.

BIO220 - Plant Physiology (3 Credits)

Plant water relations: absorption, transport and transpiration. Mineral nutrition, photosynthesis, phloem translocation, phytohormones. growth, dormancy ; seed germination, phytochrome and phtomorphogenesis and stress physiology.

BIO220L - Plant Physiology Lab (1 Credit)

Plant water relations: absorption, transport and transpiration. Mineral nutrition, photosynthesis, phloem translocation, phytohormones. growth, dormancy ; seed germination, phytochrome and phtomorphogenesis and stress physiology.

BIO221 - General Zoology II (2 Credits)

Introduction to the living animal continuity and evolution, principles of genetics, organic evolution, reproduction and development, diversity of animal life (structural patterns, classification and phylogeny, principles of nomenclatures); invertebrate and vertebrate animals; activity of life; behavior; animal environment and its influence on its distribution and adaptations.

BIO221 L - General Zoology II Lab (1 Credit)

This course aims to provide students with a hand-on experience in the study of a wide variety of animal species representing different animal phyla. Through close examination of live and preserved specimens, studentslearn how to identify and describe many of the animal phyla.

BIO230 General Microbiology (2 credits)

This course explores the biology of microorganisms whether they are unicellular, multi cellular, or even acellular. Major areas to be covered include microbial cell structure and function, physiology, metabolism, genetics, diversity and ecology. Applied aspects of microbiology will also be covered, such as biotechnology, the role of microorganisms in environmental processes, and medical microbiology. Microbiology is a prerequisite for many subjects such as virology, mycology, parasitology, bacteriology and immunology.

BIO230L General Microbiology Lab (1 credit)

Students in this course will culture microorganisms from natural sources such as their own skin, and learn various methods while studying the organisms they have cultured. The topics for the course include types of methods used to culture and study these microorganisms including aseptic technique; preparation of microbiological culture media; isolation of bacteria

from natural sources and cultivation of various types of microbes; use of microscopes and basic staining techniques; and identification of unknown bacterial isolates.
The exercises incorporate practice with (a) data analysis, (b) commonly used computational skills needed by microbiologists, and (c) safety practices for protecting the microbiologist, personnel on whom the laboratory depends, and the workspace from microbial contamination.

BCH240 Biochemistry I (3 credits)

This course explores the basic principles of biochemistry and its role in developing biological networks. Topics cover: Basic knowledge about main biomolecules, amino acids, simple sugars and fatty acids, their structure and how they assemble into macromolecules, building a cell. The course also focuses on understanding biochemical principles with an emphasis on kinetics, thermodynamics, bioenergetics and interaction of biomolecules within the metabolism.

BCH240L Biochemistry I Lab (1 credit)

Biochemistry I Lab is designed to learn students how to distinguish between major biochemical molecules (carbohydrates, lipids, proteins) by using series of specific qualitative tests for this purpose.

CHM246 Organic Chemistry I (2 credits)

The course offers comprehensive understanding of the basic principles of organic chemistry. The course describes chemical bonding, molecular geometry and hybridization, structure properties, nomenclature, synthesis, and reactions of alkanes, cycloalkanes, alkenes, alkynes, alkyl halides, and stereochemistry. Addition, elimination and nucleophilic substitution reactions. Emphasis on the mechanistic, kinetic and thermodynamic aspects governing these reactions.

CHM246L Organic Chemistry I Lab (1 credit)

This laboratory course accompanies CHM246 and is an introduction to the experimental techniques commonly used in the organic chemistry laboratory. The topics covered emphasize basic laboratory techniques; such as distillation (simple and fractional), crystallization, extraction (liquid-liquid) and characterization by physical methods such as melting point and more.

BIO300 Transmission Genetics (2 credits)

Basic principles of classical genetics. Meiosis and chromosomal basis of Mendelian inheritance. Linkage, crossing-over and gene mapping. Sex and heredity. The genetic material. Mutations and chromosome aberrations. Pattern of inheritance. Cytoplasmic inheritance. Population genetics.

BIO305 Molecular Biology (3 credits)

An extension and expansion of BCH310 emphasizing the basics of molecular genetic processes in bacteria, plants, and animals. It also includes a study of gene organization and control of gene expression in prokaryotes and eukaryotes, emphasizing applications in modern biotechnology, and the genetic and biochemical techniques involved in manipulating and assaying gene expression.

BIO305L Molecular Biology Lab (1 credit)

Molecular Biology lab applies concepts learned in the Molecular and Cell Biology course to a molecular biology research project. The research project will introduce students to standard genetic and biochemical techniques common in a molecular biology lab, such as DNA extraction, agarose-gel, electrophoresis, DNA profiling and PCR. The project also will provide students with a hands-on understanding of how modern DNA-sequencing technology, along with bioinformatic tools, can be used to discover genetic differences and understand cellular function.

BIO310 - Biotechnology (2 Credits)

It is a field of applied biology that involves the use of living organisms and bioprocesses in engineering, technology, medicine and other fields requiring biological products. Biotechnology also utilizes these products for manufacturing purpose. Modern use of similar terms includes genetic engineering as well as cell and tissue culture technologies. This course should cover the principles and the applications of new technology to plants and microbial organisms. The students would learn more about the use of genetically engineered products to solve environmental problems.

BCH310 Biochemistry II (3 credits)

This course uses basic knowledge acquired in biochemistry I for further understandment of key metabolic and biochemical concepts and pathways. Topics cover: the body's bioenergetics, key metabolic pathway for glucose, protein and lipid metabolism, glycolysis and Krebs cycle, cellular respiration, protein targeting and urea cycle, oxidation of fatty acid and lipid catabolism, signal transduction pathways. The course also focuses on how the body adjusts to variations in the demand for energy, and the relationship between misregulation of biochemical pathways and metabolic disorders and diseases.

BCH310L Biochemistry II Lab (1 credit)

Biochemistry II Lab is an advanced laboratory course that focuses on techniques for the preparation and quantitative analysis of proteins and other biomolecules presenting students with a broad spectrum of techniques, approaches and concepts of contemporary biochemistry.

BIO345 Immunology (3 credits)

The course deals with the physiological functioning of the immune system in states of both health and diseases; malfunctions of the immune system in immunological disorders (autoimmune diseases, hypersensitivities, immune deficiency, transplant rejection); the physical, chemical and physiological characteristics of the components of the immune system in vitro, in situ, and in vivo. This course will focus on the role and component of the immune system, immune response and finally disorders of the immune system. Students are introduced to basic concepts of flow cytometry, which is a new technique currently used in miost immunology laboratories worldwide. we aims at preparing the students for graduate studies if they intend to do so.

BIO390 Graduation project (2 credits)

This course includes the participation in a laboratory or library research project under supervision of a faculty member.

BIO380 Research Methods (2 credits)

Research methods in Sciences is intended to provide students with the opportunity to experience the scientific discovery and design process. Students will have the opportunity to apply scientific knowledge in the context of developing a research project and how to choose the best way to investigate it. Research methods and experimental design will be emphasized, including the search and study of articles from the scientific literature. Each student is expected to design his/her own research project. Laboratory exposure is an additional component of this course. Students present their research in the written form of a scientifically formatted paper.