College of science
Biology Department

BACHELOR OF SCIENCE
BIOLOGY PROGRAM
GUIDEBOOK

Content

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1 Overview

Overview

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Students enrolled in biology program will study ecology, microbiology, zoology, botany, and all biological processes that occur within living things.

Several subjects are covered in the biology program, including molecular biology, ecology, biodiversity, parasites, invertebrates, vertebrates, physiology, comparative anatomy and embryology, and genetics and evolution.

In order to preserve the existence of living species and provide long-term solutions for environmental issues, one of the top goals of the biology program is to advance scientific research in specialized domains.

2 Mission - Goals

Mission - Goals

College of science
Biology department

Mission

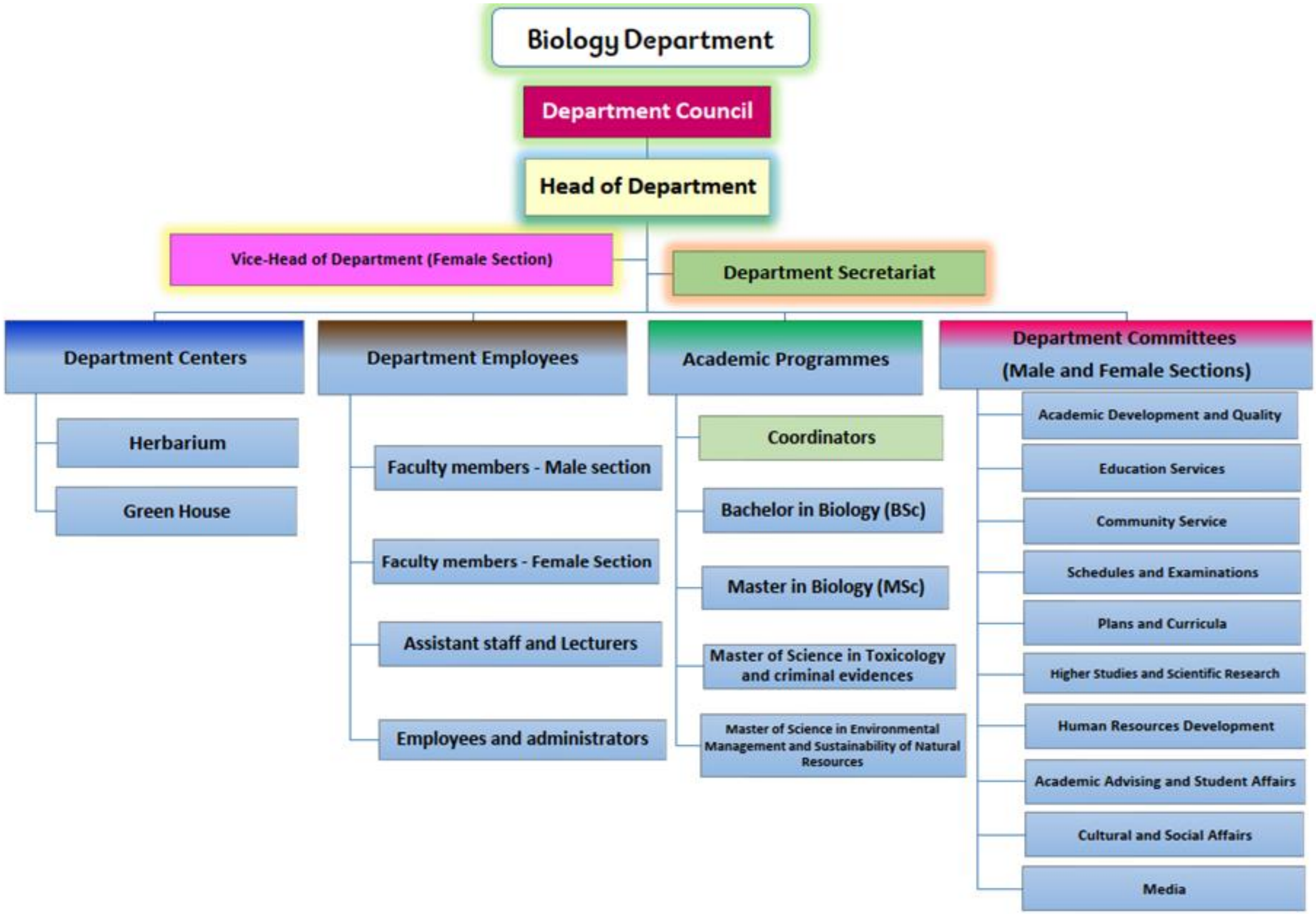
Provide a high-quality academic program that qualifies its graduates knowledgeably, skillfully, and perceptively to compete in the labor market and serve the environment and society.

Goals

Provide a high-quality academic program that qualifies its graduates knowledgeably, cognitively, and skillfully to serve the environment and community and to strongly compete in the labor market.
Develop the academic and institutional environment of the program in the light of quality standards which encourage creativity and innovation.
Provide the necessary ingredients for conducting outstanding scientific research in cooperation with governmental and private agencies concerned with biological research.
Strengthen the relationship of the student and the graduate with the community through identification of the labor market, field training, and conducting field and biological research studies.
Form partnerships with prestigious international and regional universities to transfer and localize modern technology.

3 Organization chart

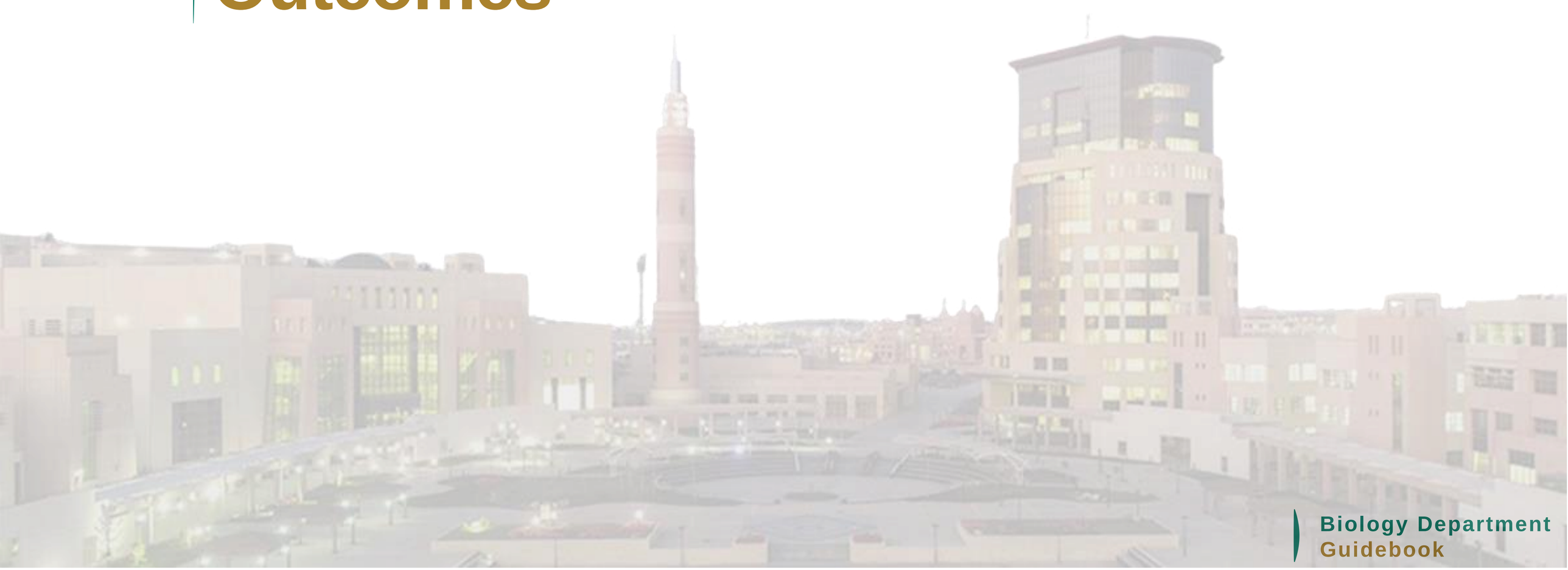
Organization chart



Head of Department/
Dr. Mohammed Obaid Saleem

Dean of College/
Prof. Mutaib Al-Ghamdi

4 Program Learning Outcomes



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Program Learning Outcomes

Knowledge and Understanding:	
K1	Explain the fundamental concepts, theories and principles of the different biological phenomena and scientific terms.
K2	Describe the environmental conditions and their impact on the ecosystem and identify the principles of biodiversity, taxonomy, and vital functions in living organisms.
K3	Outline the advanced processes, techniques, and applications in the field of biological sciences.
K4	Illustrate the abnormal conditions that biological organisms may suffer from and how to be diagnosed and treated.
K5	State the theoretical concepts of the biochemical and physiological changes and relationships between cells, tissues, and organs.
Skills	
S1	Establish the appropriate scientific methods and techniques for analyzing raw data and solving environmental problems.
S2	Apply the abnormal biological lab results and use statistical approaches when evaluating data.
S3	Amend biological and environmental control measures and report the different ways in management and maintenance of biological as well as environmental balances.
S4	Use microscopic examination and analytical tests of cells, tissues, blood, body fluids, and other materials.
S5	Design proper procedures, for collecting, safe handling, processing, and analyzing biological specimens to maintain accuracy and precision.
Values, Autonomy, and Responsibility	
V1	Respect leadership, team player, and the desire for continuing education for one's professional development.
V2	Support the ability to handle stressful situations calmly and efficiently.
V3	Show effective communication within groups and with other biological, laboratory professionals and understand limits of knowledge and skill and seeks advice and assistance.
V4	Utilize computer technology applications to interact with biological and environmental laboratory information systems.

5 Study plan

Study plan

First year

First Level			
Code	Course Name	Hr	Requisite
101 BIOL-4	General Biology	4	-
101 MATH-3	Mathematics 1	3	-
011 NGL-6	Intensive English Program-1	6	-
111 IC1-2	Entrance to Islamic Culture	2	-
Total		15	

Second Level			
Code	Course Name	Hr	Requisite
101 CMS-2	Introduction to Computer	2	-
101 CHEM-4	General Chemistry-1	4	-
101 PHYS-4	Introduction to Physics	4	-
201 ARAB-2	Arabic Language Skills	2	-
110 NGL-3	Scientific English	3	011 NGL-6
112 IC1-2	Islamic Culture 2	2	-
Total		17	

Second year

Third Level			
Code	Course Name	Hr	Requisite
102 CMS-3	Computer Skills	3	101 CMS-2
202 ARAB-2	Arabic Editing	2	-
113 IC1-2	Islamic Culture 3	2	112 IC1-2
212 BIOL-2	Cytology	2	101 BIOL-4
251 BIOL-2	Histology	2	101 BIOL-4
241 BIOL-3	Invertebrates	3	101 BIOL-4
271 BIOL-2	Plant Morphology	2	101 BIOL-4
Total		16	

Fourth Level			
Code	Course Name	Hr	Requisite
114 ICI-2	Islamic Culture 4	2	-
261 BIOL-2	Algae	2	101 BIOL-4
252 BIOL-4	Chordata	4	101 BIOL-4
271 CHEM-3	Organic Chemistry	3	-
272 BIOL-3	Plant Anatomy	3	271 BIOL-2
Total		14	

Third year

Fifth Level			
Code	Course Name	Hr	Requisite
312 BIOL-3	General Genetics	3	212 BIOL -2
342 BIOL-3	General Parasitology	3	241 ZOOL-3
351 STAT-3	Biochemistry	3	-
362 BIOL-2	Archegoniate	2	271 BIOL-2 272 BIOL-3
363 BIOL-3	Bacteria and Viruses	3	101 BIOL-4
Total		14	

Sixth Level			
Code	Course Name	Hr	Requisite
321 BIOL-3	Ecology	3	101 BIOL-4
343 BIOL-3	Entomology	3	241 ZOOL-3
353 BIOL-4	Animal Physiology 1	4	252 BIOL-4 351 STAT-3
373 BIOL-4	Basic Taxonomy of Flowering Plants	4	271 BIOL-2 272 BIOL-3
374 BIOL-3	Plant Physiology 1	3	272 BIOL-3 351 STAT-3
Total		17	

Fourth year

Seventh Level			
Code	Course Name	Hr	Requisite
431 BIOL-1	Microscopic Techniques	1	251 BIOL-2 272 BIOL-3
432 BIOL-3	Research Project	3	-
444 BIOL-3	Medical and Economic Entomology	3	343 BIOL-3
454 BIOL-2	Animal Physiology 2	2	353 BIOL-4
464 BIOL-3	Mycology and Plant Pathology	3	363 BIOL-3
475 BIOL-3	Plant Physiology 2	3	374 BIOL-3
476 BIOL-2	Experimental Plant Taxonomy	2	373 BIOL-4
Total		17	

EighthLevel			
Code	Course Name	Hr	Requisite
413 BIOL-3	Molecular and Cytogenetics	3	312BIOL-3
414 BIOL-2	Biotechnology	2	363BIOL-3
433 BIOL-2	Flora and Fauna of Saudi Arabia	2	-
422 BIOL-2	Environmental Pollution	2	353 BIOL-4
455 BIOL-2	Immunology	2	363 BIOL-3
456 BIOL-3	Embryology	3	252 BIOL-4
477 BIOL-2	Economic Botany	2	374 BIOL-3
Total		16	

6 Course description

Course Description

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101 BIOL –4 General Biology

The course provides students with general biology knowledge on water properties and cytoplasm. Topics to be covered the cell division and genetics, then the student studies viruses, bacteria, fungi, and algae and the plant classification and archegoniate plant. Plant morphology and plant tissues. Plant physiology, enzymes, Animal tissues, Animal physiology (digestive). Animal physiology (circulatory systems). Endocrine system. And the last part are the Ecology and its relationship with biodiversity.

Course Description

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212 BIOL – Cytology

This course will provide the students with studying of cell structure and function focusing on the biology of eukaryotic cells and cover topics such as membrane structure and composition, transport, synthesis, and macromolecules (carbohydrates, DNA, RNA, proteins, lipids). Study the structure and function of cell organelles. The course covers important cellular processes such as cell cycle regulation, signal transduction, cell division, apoptosis, and cancer cell biology.

Course Description

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241 BIOL – Invertebrates

During the course, students will study the basic concepts about invertebrate animals and the understanding of the various developmental stages through the study of their life cycles. Emphasize the importance of biological sciences for the individual to understand the basic concepts of life. Enabling students to be able to identify and describe invertebrate organisms in their field, and that the completion of this course successfully essential in order to enable students to study the decisions of the future in the specialty.

Course Description

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251 BIOL- Histology

The course will involve a study of general tissue characteristics and will explore histologically the different tissue types in the body including epithelial, connective, skeletal, blood/vascular, muscular, and neurological tissues as well as the various organ systems including digestive, respiratory, urinary, endocrine, cardiovascular, lymphatic, integumentary (skin), male and female reproductive, and special senses (eye and ear).

Course Description

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252 BIOL – Chordates

This course covers detailed structural and functional aspects of vertebrate animals, their taxonomy and anatomy. The course follows the evolution of morphological and anatomical features of body organs in vertebrate classes. The course also describes different types of structural modifications which are developed in the different body systems or organs as modes of adaptation with the changes in the surrounding environment. Study samples were taken for each taxon as a model of study.

Course Description

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261 BIOL – Algae

The course provides core study in the theoretical aspects of phycology. The course will provide a comprehensive overview of the biology and ecology of algae including evolution, classification, structure, ultrastructure, cultivation techniques, life cycles, habitats, photosynthetic pigments, accumulation and storage of products, and reproduction methods. Emphasis on the ecological role of algae in different aquatic ecosystems, their impacts (harmful algae blooms, red tide, Toxins of freshwater and marine algae), and their applications. Applications of algae in environmental assessment, biomonitoring of algae and control of nuisance algae. Students will gain specialized skills to enable them to pursue a career in research, control or teaching related to phycology.

Course Description

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271 BIOL – Plant Morphology

The course acquires knowledge concerning learn the basic of plant morphology. Describe the morphological characteristics of herbaceous and woody stems. Interpret, evaluate the root, stem, and leave types. Understand the morphology and development of reproductive parts. Apply knowledge of the structural adaptations in plants growing in different environment Communicate ideas about the fruit and seed development.

Course Description

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272 BIOL – Plant Anatomy

This course will provide students with valuable knowledge in the basic internal structure of plants, including their cells, tissues, and organs. It will provide the relationship tissues structure and the possible functions. Equally, it will put out the effect of the environment on plant structure. The lab will consist of experience with the use of microscopes, the sectioning and staining of plant materials, and the observation of plant structures.

Course Description

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312 BIOL – General Genetics

The course contains the basic and essential information on the genetic field as well as, explanation of some experiments by which the students understand the genetic materials, hereditary of traits and how the organism traits are controlled by these materials. What are genes and chromosome? Somatic cells and germ cells. Complete dominance hereditary, incomplete dominance hereditary, sex liked hereditary, cross over, mutations, genetic material, gene expressions, molecular genetics techniques such as PCR, DNA fingerprint and principle of genetic engineering.

Course Description

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321 BIOL – Ecology

Ecology is the study of the relationships between plants, animals, people, and their environment and importantly, the balances between these relationships. Ecology guides students to explore and demonstrate an understanding of the importance of ecological balance in planting design, hydrology, habitat restoration, planting installation and maintenance for sustainable and healthy landscapes. Students will gain specialized skills to enable them to pursue a career in research or teaching related to Ecology.

Course Description

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342 BIOL – General Parasitology

The course provides students with foundational knowledge on epidemiology and control of parasitic infections. Topics to be covered include animal associations, the nature of parasitism, the host-parasite relation, concept and the evolution of parasitic mode of life, advantages and disadvantages of parasitism, host specificity and susceptibility, epidemiology and control of common parasitic infections, transmission of parasites from host to host, life cycle of some protozoan and metazoan parasites and the role of vectors in the transmission of parasitic diseases.

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343 BIOL – Entomology

This course provides students with knowledge and understanding of various aspects of insect evolution and biology, with a guide to basic insect morphology, anatomy, physiology, ecology, economic important, embryology, taxonomy, and a survey of the insect orders. The course will provide a comprehensive overview of the biology of insect including Structure of the body wall, head and its appendages, abdomen and its appendages, digestive system, circulatory and respiratory systems, nervous system and sense organs, muscular system, reproductive system, glands embryogenesis, and Insect taxonomy.

Course Description

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353 BIOL – Animal Physiology I

This program focuses on the study of function and function of all system of the body from the structure and function and the study the mechanisms of all vital processes, including the body fluids, digestive, metabolism, circulatory, respiratory, excretory, muscular and end with nervous system.

Course Description

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362 BIOL – Archegoniate

The Archegoniate course deals with the study of identifying the Archegoniate and its classification in the plantae kingdom. Then studying the Haptophyte, Anthocerotophyta and Bryophyta. In addition to the Pteridophytes and Gymnosperms including all their divisions.

Course Description

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363 BIOL Bacteria and Viruses

This course provides students with knowledge and understanding of various aspects of bacteriology and virology. It will stress critical thinking and introduces advanced concepts of morphological characteristics, internal structure, cell wall structure, movement, speculation, growth and reproduction, identification, and classification bacteria in addition to the structure of viruses, the methods of distribution, and the animal and plant viral diseases. The additional purpose of this course is to help students be up to date with the new issues, and how to benefit from various biological activities in many applications. For instance, pharmaceutical industries, the food industry, and the applications of electrical energy from cracking organic and inorganic pollutants in the environment.

Course Description

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373 BIOL – Basic Taxonomy of Flowering Plants

This course will enable students to understand the basis of knowledge of the plant Taxonomy, and will show the basic principles, classification, general characters, and distribution the different sections in the plant taxonomy.

Course Description

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374 BIOL – Plant Physiology 1

This course provides students with knowledge and understanding of various aspects of plant physiology. It will stress critical thinking and introduces advanced concepts of structure and functions of plant cellular membranes, properties of the colloidal solutions, plant water relations at the cellular level: active and passive transport systems, the concept of pathways, structure of stomatal apparatus and the mechanism of stomatal closure and opening, whole plant water relations, plant mineral nutrition, elements deficiency symptoms, xylem, and phloem transport.

Course Description

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413 BIOL – Molecular and cytogenetics

Understand the fundamentals of Molecular Genetics and modern techniques in genetic engineering, in addition have good information regarding genetic diseases. Furthermore, to gain the ability to read the hospital reports that describe the mutations. Following the genetic disease in the public using pedigree.

Course Description

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414 BIOL– Biotechnology

To acquire fundamental knowledge concerning biotechnology, genetic engineering, and DNA modification. To acquire knowledge about the main kinds of biotechnology and their applications in various fields. To raise students' awareness about ethical issues related to biotechnology. To acquire basic knowledge about the economic importance of biotechnology.

Course Description

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422 BIOL-Environmental Pollution

This course deals with major problems of pollution of the atmosphere, water, the land surface, and the food chain. It covers processes responsible for the occurrence and release of pollutants in the environment, dispersion mechanisms, the hazards associated with different types of pollutant, Problems of accumulation of toxic substances, and procedures for the reduction of emissions and remediation of contaminated environments.

Course Description

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431 BIOL– Microscopic Techniques

This course aims to provide students with knowledge, understanding, background and overall preparation of whole mount, teasing and smearing methods of different samples. Also, this course introduces the basics of animal and plant tissues preparation for microscopic examination, including an introduction to microscopy and anesthesia, types of fixations, dehydration, clearing, infiltration, embedding, cutting, and staining with different histological and histochemical dyes.

Course Description

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432 BIOL – Graduation Research

Introduction to types of experimental designs. Usage of conventional and electronic facilities for collection of scientific information. Common steps for construction of poster presentation of research topics Execution of ANOVA program (SPSS). Revision and debate with his supervisor. Research proposal Research point, search, experiment, collecting data, defend and present the results.

Course Description

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433 BIOL- Fauna and Flora of Saudi Arabia

The course studies the concepts of fauna and flora and focus on the animals and plants in Saudi Arabia. Also, it will be studying the biographical population of animals and plants and the different factors that affect their distribution

Course Description

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444 BIOL – Medical and Economic Entomology

This course is designed to cover the economic and medical entomology - the damage and the appearance of agricultural insect pests and methods of controlling them - arthropods of medicinal and veterinary importance in the Kingdom of Saudi Arabia and methods of control –store pests and methods of control - beneficial insects and the possibility of benefiting from them economically.

Course Description

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454 BIOL – Animal Physiology 2

The course study focuses hormonal mechanisms in the endocrine system, including the endocrine axes between the brain and other body endocrine glands. In addition, the role of hormones and regulators of growth, metabolism, and immunity against serious diseases like cancer will be discussed.

Course Description

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455 BIOL- Immunology

The course focus on working knowledge of current immunological principles as they relate to the cells and molecules of the immune system, how they interact in defending the body against invading microorganisms, how they develop and acquire the ability to recognize antigens.

Course Description

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456 BIOL- EMBRYOLOGY

Embryogenesis deals with the processes by which a single celled stage transforms into a multicellular and a well differentiated organism and how the structures change with time morphologically, anatomically, and physiologically. Also, organogenesis and further development of any species depends on the type of its egg and on its habitat. Further, it is designed for the students to understand gamete formation, fertilization, and embryo development concepts in animals. Also, comparison of the events of cleavage, blastulation and gastrulation in selected chordate embryos must be covered. Understanding the formation of some selected organs created by ectoderm, endoderm, and mesoderm in addition to extra-embryonic membranes and their role in the formation of placenta. Knowing the different stages of pregnancy in humans and the events that happen in each stage with clear idea about multiple births and formation of twins.

Course Description

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464 BIOL- Mycology and Plant Pathology

This course is designed to provide the students with general and fundamentals characteristic of fungi, recent classification of fungi into classes, orders and families. It will provide the students with the main characteristics of fungi including vegetative structure, nutritional categories, reproduction types (sexual and a sexual), as well as the main factors affecting their growth. Representative samples of major families (genera and species) will be studied in detail and their life cycles and caused disease will be included. The course will provide the students with the fundamentals of plant diseases, symptoms, dissemination methods, causal pathogens, and different strategies of control. The economic importance of fungi will be included briefly in this course.

Course Description

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475 BIOL – Plant Physiology 2

This course will provide students with an essential knowledge in plant physiology fields including major cellular molecules, energy conversion processes in living systems, enzymes and their characteristics and work, process of photosynthesis and respiration. Equally, it will offer valuable information on hormones and plant growth regulators and the mechanisms of dormancy and aging in plants.

Course Description

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476 BIOL- Experimental Plant Taxonomy

This course provides students with knowledge and understanding of various aspects of plant taxonomy. It provides core study in the using comparative experimental methods in the plant classification. It will stress critical thinking and introduces advanced concepts of the Taxonomical anatomy (stomata and epidermal trichomes, Vascular bundles, types and distribution), palynology and plant taxonomy, pollen grains, Cytotaxonomy, taxonomical evidence from chromosomes, Chemotaxonomy (Alkaloids, Flavonoids), Protein fingerprinting of plant species, Molecular taxonomy.

Course Description

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477 BIOL – Economic Botany

This course provides core study about the economic plant in Saudi Arabia that is used as a source of food, medicine, clothing, shelter and study their importance to the economy of Saudi Arabia and way of their cultivation regarding the medicinal plants. This course provides students with knowledge and understanding of various aspects of wood plants, spice plants, oils plants, sugar plants, starches and cellulose products, rubber plants, gums and resins, and beverage plants.

Course Description

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105 ZOO- Zoology for Health Sciences

This course focuses on an introduction to biology, life, and the levels of organization of the human body from atoms, molecules of life to the organism. A macromolecule's structure & functions within the cell (carbohydrates, lipids, proteins, nucleic acids (DNA & RNA structure). DNA biology: central dogma of molecular biology, DNA replication, gene expression (transcription and translation) and genetic codons. The cell types, cell structure and functions, cell membrane, protoplasm (cytoplasm and karyoplasm, chromatin, nucleolus, nuclear matrix) and Types of cell transport. Structure and functions of cellular organelles of eukaryotic cells (membranous and non-membranous organelles), cytoskeleton, cytoplasmic inclusions, cellular metabolism. Cell cycle and cell division (Mitosis & Meiosis) and the differences between them, chromosome structures and types. Normal histological structure of different tissues of human body (epithelial & glandular epithelium, connective, nervous, and muscular tissues). Anatomy and physiology of different organ systems (digestive system, respiratory system, urinary system, nervous system, and cardiovascular system)..

7 Graduate Attributes

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Biology Department
Guidebook

Graduate attributes

Work professionally in various fields of biological sciences while adhering to Islamic values, national identity, and academic integrity.

Continuous access to modern knowledge in the various fields of biological sciences, practical and theoretical.

The ability to apply specialized and modern skills in all branches of biological sciences.

Proficiency in self-learning and continuous in the field of biology and collaborative work within an integrated team.

Apply critical thinking, analytical and problem-solving skills.

Apply relevant academic skills, effective communication, initiative, teamwork, and leadership.

Optimal use of various modern technological and information techniques in all branches of biology.

Commitment to work ethics, responsibility, and accountability in the various fields of neighborhoods..

Achieving the principle of citizenship, community service and active participation in solving problems..

8 Graduation

Graduation

The student graduates after successfully completing the graduation requirements according to the study plan, provided that his cumulative GPA is not less than 2 (acceptable grade).

9

Student Admission Requirements

Student Admission Requirements

College of science
Biology department

Conditions necessary for admission to the University:

The student must have a certificate of general secondary school or its equivalent (from the inside kingdom or outside it).

The certificate or its equivalent must not exceed 5 years since the graduation of the holder from secondary school. In this respect, the university council may have the right to make exceptions if there are other convincing reasons.

The student must have good conduct.

The student must pass all tests or private interviews deemed necessary by the KKU council.

The student must be medically fit.

The student must get a letter of approval from his/her employer if he/she works in the public or private sector.

The student must satisfy any other condition identified by the university council.

To admit the Bachelor of Science in Biology Program, an applicant must hold a Saudi High School Certificate Science Section (or it is equivalent), with a grade of 70% for both boy or girl (score may be higher or lower according to the levels and number of postsecondary students).