

Description of bachelor's courses

ZOO 103	Principles of Zoology	3 (2+1)
Content	Structure, function and cyto genetics of the animal cell; different animal tissues; general characteristics and taxonomy of the Animal Kingdom; general characteristics of Subkingdom Protozoa with selected representative examples; taxonomy and characteristics of the Animal Kingdom from Porifera to Chordata with selected representative examples; an introduction in animal physiology with special emphasis on nutrition, digestion and metabolism; blood composition and functions.	
Pre-requisite	—	

ZOO 212	Parasitology	3 (2+0+1)
Content	Understanding and practicing the different methods and techniques applied for identification of parasitic infections. Identification of the main characteristics of the different stages of the parasites. How to determine: the site of infection, diagnosis and diagnostic stages, pathogenicity and treatment. How to elucidate the life cycle of a parasite (host (s) and mode of transmission). Mastering photography, measurements and report writing.	
Pre-requisite	Zoo 103	

ZOO 242	Cell Biology and Physiology	3 (2+0+1)
Content	The emergence of modern cell biology; prokaryotes and eukaryotes; structure and function of biological membranes; transport of substances through biological membranes; intercellular signals and directing synthesized proteins to their sites inside and outside the cell; cell organelles in terms of structure and function; the cytoskeleton; the cell cycle; apoptosis (programmed cell death); stem cells; glycolysis; Krebs Cycle; oxidative phosphorylation.	
Pre-requisite	ZOO 103	

ZOO 262	Microscopic Preparations	2 (1+0+1)
Content	Different types of fixatives and their advantages and disadvantages; the steps involved in light microscopic technique, and how to treat samples with appropriate; electron microscope, methods of fixation, washing, dehydration, embedding, ultramicrotomy, staining and investigation of ultrathin sections by transmission electron microscopy to identify cell organelle ultrastructure.	
Pre-requisite	ZOO 103	

ZOO 305	Modern Animal Taxonomy	2 (1+0+1)
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Content	The general fundamentals of taxonomy; history of taxonomy and classification stages; objectives and mission of taxonomy; significance of taxonomy to biology; classification theories; species and subspecies; systematics and higher ranks; diversity and insulation mechanism; classification characteristics, traditional (virtual), numerical, molecular, chromosomal, chemical, immunological and cellular classification methods; taxonomic discrimination and differentiation (intraspecific individual variations); taxonomic procedures [displaying systematic results including: description, classification key (definition, types and design), taxonomic papers, statistical methods, the importance of quantitative methods in taxonomy]; binomial nomenclature; philosophical concept, interpretation and regulations of scientific nomenclature.
Pre-requisite	ZOO 103

ZOO 311	General Entomology	3 (2+0+1)
Content	External structure: cuticle structure and function, structure of head, thorax and abdomen; internal structure (anatomy): structure of the digestive, excretory, circulatory, respiratory, nervous and endocrine systems and types and functions of hormones; structure of the reproductive system; insect growth and development (metamorphosis): eggs and fertilization, types of larvae and pupae; general insect taxonomy: apterygota, pterygota (exopterygota and endopterygota).	
Prerequisite	ZOO 103	

ZOO 317	Medical Arthropodology	3 (2+0+1)
Content	General morphology; dynamic relationship between the host and parasite of some insects of minor medical importance as cockroaches, beetles, true ants, wasps and moths, and of some insects of major medical importance as blood sucking species of order Hemiptera including Family Cimicidae (Bed Bugs), order Phthiraptera (Body lice), order Diptera including families of Ceratopogonidae (punkies, small biting flies), Simuliidae (black flies), Psychodidae (sandfly), Culicidae (mosquitoes), Asilidae (robber flies), Tabanidae (horse flies), Sarcophagidae (flesh flies), Muscidae (House flies) and Glossinidae (tsetse fly); order Siphonaptera (fleas), order Ixodida (ticks), suborder Opilioacariformes (parasitiform mites); arthropod toxins, allergic secretions and endemic pathogens in Saudi Arabia; personal protection and prevention of arthropod pests.	
Pre-requisite	ZOO 111	

ZOO 320	Ichthyology	2 (1+0+1)
Content	Introduction; classification of fish; fish environments; fish external features; skin structure; internal structure including muscular, digestive, circulatory, respiratory, urogenital, nervous, endocrine and skeletal systems; fish growth	

	and age estimation; fish migration and geographical distribution.
Pre-requisite	ZOO 103

ZOO 325	Ornithology	2 (1+0+1)
Content	Historical introduction in ornithology; definition of birds; economic benefit; profiles of the effects of birds on ecological balance; external structure of birds; energy required for feather moulting; maintaining temperature; mechanism of temperature regulation of birds compared to mammals; study of different bird systems; most common bird diseases including Newcastle disease and avian influenza; bird migration and reasons; most important migratory birds via Saudi Arabia and times; birds mating; egg incubation; parental care of Newly hatched birds; maturation; bird classification; bird species endemic to the Arabian Peninsula; conservation and development of birds and most significant conservation organizations.	
Pre-requisite	ZOO 103	

ZOO 326	Mammalogy	2 (1+0+1)
Content	Classification of and a historical overview on mammals; study of anatomically and functionally distinctive mammalian organs and their responses to stimuli including hair, mammary gland, sweat gland, scent glands, chewing system and terminal skeleton; study of some mammalian orders.	
Pre-requisite	ZOO 103	

ZOO 327	Herpetology	3 (2+0+1)
Content	Introduction to amphibians and reptiles; biological study of the two classes (Amphibia and Reptilia) in terms of external features and internal structures; the emergence of amphibians and reptiles, reproduction and life history; homeostasis; relationship with the external environment; brief on amphibians and reptiles in Saudi Arabia.	
Pre-requisite	ZOO 103	

ZOO 332	General Physiology	3 (2+0+1)
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Content	Study the physiological functions and relevance of form to function; neural and hormonal control of the various systems in mammals, including the digestive, cardiovascular, blood, respiratory, excretory, nervous and reproductive systems in male and female.
Pre-requisite	ZOO 103

ZOO 342	Molecular Biology	2 (1+0+1)
Content	Nature and properties of genetic material; DNA as a genetic material; RNA as a genetic material of some viruses. DNA synthesis and the molecular gene concept; DNA sequence and duplication in chromosomes; The concept of gene expression (transcription and translation and processing of RNA molecules); an introduction to regulation of gene expression in eukaryotes.	
Pre-requisite	ZOO 242	

ZOO 352	Fundamentals of Genetics	2 (1+0+1)
Content	Branches of genetics; the relationship between genes and characteristics of living organisms; genetics as an experimental science; chromosomal basis of inheritance (chromosomes, mitotic and meiotic divisions and chromosomal theory); Mendelian inheritance; extensions of Mendelian Genetics; Non-Mendelian inheritance; mutations and DNA repair pathways and sex identification in eukaryotes; introduction to recombinant DNA technology and its applications.	
Pre-requisite	ZOO 342	

ZOO 355	Wildlife Animal Genetics	2 (2+0+0)
Content	Animal genetic diversity concept. Loss of genetic diversity and its effects on the population. Population size and its effects on the survival of species (Genetic drift, inbreeding and the reduction in gene flow). Genetic erosion and genetic diversity. Methods used in genetic diversity conservation (Ex situ and in situ conservation). Population augmentation. Gene pools and endangered animal species.	
Pre-requisite	ZOO 352	

ZOO 366	Fisheries Management	2 (1+1)
Content	Introduction; fish pond management: irrigation, drainage and cleaning; water quality management: water control and analysis; production management: fingerling production, feeding and harvesting; nutrition management: natural feeding, artificial feeding (diet preparation), feeding methods and feeding rates; marketing management: live fish marketing, frozen fish marketing, market surveillance and monitoring.	

Pre-requisite	ZOO 320
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ZOO 373	Wilderness Ecology	2 (1+0+1)
Content	Introduction (basic concepts in ecology); ecosystem basics (living and non-living components); element cycles; terrestrial communities; geographical distribution of animals; natural environmental factors (temperature, light, humidity); bio-environmental factors (symbiotic relationships); adaptations of animals to the desert environment.	
Pre-requisite	ZOO 103	

ZOO 374	Aquatic Ecology	2 (1+0+1)
Content	Introduction; properties of the aquatic environment; characteristics: physical characteristics (temperature, salinity, transparency and turbidity); chemical characteristics (dissolved oxygen, other dissolved gases, pH and hardness); aquatic ecosystem: aquatic plants and animals.	
Pre-requisite	ZOO 103	

ZOO 375	Pollution	2 (1+0+1)
Content	Definition of pollution and its relationship to the ecosystem; definition of pollutants; types of air, water and food pollution; physical contaminants (heat, noise and radiation); ways of pollutant control; biological effects of pollutants; pollution in Saudi Arabia and Gulf countries.	
Pre-requisite	ZOO 103	

ZOO 381	Aquaculture Economics	2 (1+0+1)
Content	Introduction; fisheries and aquaculture; the need to fish farming; contribution of aquaculture to food security; project planning and feasibility study; key factors determining site selection: water resources, soil, site topography and water bodies; obstacles to aquaculture development; future of fish farming in the Arab World.	
Pre-requisite	ZOO 320	

ZOO 382	Insect Diversity in Saudi Arabia	2 (1+0+1)
Content	Biodiversity in the deserts of the Arabian Peninsula; insect adaptation to desert life; study of the biology, nomination and distribution of the most important insect species in Saudi Arabia; collecting insect species from selected environmental tribes in various regions of Saudi Arabia; definition and preserving insects collected from the field	
Pre-requisite	ZOO 311	

ZOO 412	Parasite Immunology	2 (1+0+1)
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Content	Basics of parasite biology; preliminary information on innate and acquired immunity; immunological properties of some parasites endemic in Saudi Arabia; protective or pathologic pathways of the immune system; laboratory tests for antigen preparation and diagnosis using external antigen-antibody interaction.
Pre-requisite	ZOO 212

ZOO 413	Insects and Environmental Health	2 (1+0+1)
Content	Definition of entomology and its impacts on environment health; insects as a source of inconvenience; insect propagation; terrestrial insects; aquatic insects; life cycle of insects and seasonal outbreak; activity rate and distribution in different environments; beneficial and harmful insects; plant infection through insect nutrition; human infection through insect egg laying; insect pests of stored material; negative and positive impact of insects on environmental health.	
Pre-requisite	ZOO 311	

ZOO 420	Comparative Vertebrate Anatomy	2 (1+0+1)
Content	Review of anatomical terms, historical overview and study methods and significance; comparative anatomy of the skin and skeletal systems in vertebrate classes.	
Pre-requisite	ZOO 103	

ZOO 423	Fundamentals of Descriptive Embryology	2 (1+0+1)
Content	Basic principles of embryogenesis, such as: gametogenesis stages, fertilization, cleavage, gastrulation, formation of the three embryonic germ layers (endoderm, mesoderm and ectoderm), organogenesis and the formation of some main body organs.	
Pre-requisite	ZOO 103	

ZOO 424	Principles of Experimental Embryology	2 (1+0+1)
Content	Introduction and historical overview of experimental embryology and generation theories; cellular differentiation, embryonic induction, embryonic organizers; embryonic malformations; embryonic tissue culture; parthenogenesis; artificial insemination; some applied studies on embryos (production of monozygotic twins, chimera, stem cells).	
Pre-requisite	ZOO 423	

ZOO 425	Economic Fish and Crustaceans	2 (1+0+1)
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Content	Introduction; economic fishes: freshwater, marine and brackish water fish; fish with most hatching, rearing and nurturing potential in Saudi Arabia; reproduction and life cycles of selected fish examples; economic crustaceans: reproduction and life cycle of selected crustacean examples; general principles of fish and crustacean rearing: ponds, water, nutrition; stages of fish farming.
Pre-requisite	ZOO 320

ZOO 432	Endocrinology	2 (1+0+1)
Content	Simplified study of hormones or chemical messengers, giving an example of each; chemical structure of hormones; study of the endocrine system in some animals.	
Pre-requisite	ZOO 332	

ZOO 433	Immunology	2 (1+0+1)
Content	Background in immunology, including: definition and history of immunology, structure of cells and organs of the immune system, innate immunity, complement system, passive, negative and adoptive immunization; antigens and immunogens; antigen presentation; antibody functions; humoral and cell-mediated immunity; excessive immune response; immune deficiency disorders and autoimmune immune diseases.	
Pre-requisite	ZOO 332	

ZOO 434	Excretion Physiology Same name as 435	2 (1+0+1)
Content	Anatomical structure of the excretory system in mammals; kidney functions; filtration rate in kidneys and its hormonal regulation; juxta-glomerular apparatus; steps of urine formation; skin and its functions.	
Pre-requisite	ZOO 332	

ZOO 435	Excretion Physiology	2 (1+0+1)
Content	Coordination and integration between the nervous system and endocrine system; nervous tissue; neuroreceptors; neural coupling; Start and transport of nerve impulses; reflex action; structure of the nervous system and functions of its different parts.	
Pre-requisite	ZOO 332	

ZOO 436	Reproductive Physiology	2 (1+0+1)
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Content	Anatomical structure of the male reproductive system in mammals; reproductive physiology in male including puberty, sex identification and differentiation and spermatogenesis; ovulation. Reproductive cycles in females; fertilization.
Pre-requisite	ZOO 332

ZOO 441	Histochemistry	2 (1+0+1)
Content	Theoretical and scientific foundation of the detection of chemicals in animal tissue including carbohydrates, proteins, lipids, amino acids, nucleic acids, other enzymes, chromosomes and mineral elements.	
Pre-requisite	ZOO 245, ZOO 262	

ZOO 455	Genetic Engineering	2 (1+0+1)
Content	Introduction to the fundamentals of recombinant DNA technology; human genome project; gene therapy; biotechnology; plants and animals and genetically engineered food; an overview of some features of the controversy over genetic engineering; laws, regulations and rules.	
Pre-requisite	ZOO 342, ZOO 352	

ZOO 456	Bioinformatics	2 (1+0+1)
Content	Introduction to computational biology and bioinformatics; data analysis; sequencing of proteins and nucleic acids; determination and assembly of genome sequences; predicting protein structure; DNA microarray data analysis; data collection; biological pattern discrimination; bionetworks; applications of bioinformatics software and tools.	
Pre-requisite	ZOO 342	

ZOO 457	Cytogenetics and Cell Culture	2 (1+0+1)
Content	Sterilization and contamination prevention techniques; media types and preparations; cell separation and culturing; chromosome structure and terminology; numerical and structural variations and aberrations of chromosomes; chromosomal profiling and staining techniques.	
Pre-requisite	ZOO 342, ZOO 352	

ZOO 458	Human Genetics	2 (1+0+1)
Content	Analysis of pedigree records and Mendelian inheritance patterns in humans; Non-Mendelian inheritance (Mitochondrial inheritance, anticipation phenomenon, genomic imprinting and dosage compensation); twin studies and genetic applications; chromosomal aberrations and syndromes; multi-factorial inheritance and most common genetic disorders in humans; consanguineous marriages; genetic counseling.	

Pre-requisite	ZOO 342, ZOO 352
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ZOO 461	Laboratory Techniques	2 (0+0+2)
Content	Laboratory safety instructions; experimental animals; properties of water as a solvent; pH and buffer Solutions; methods and technologies for separation of molecules; types and uses of colorimetric measurements; separation of amino acids by thin layer chromatography and identifying abnormalities in the metabolism of amino acids; separation and determination of alkaline phosphatase and the determination of its physiological and pathological levels; determination and clinical evaluation of serum total protein and albumin/globulin ratio; study of carbohydrate metabolism in laboratory animals by comparing the levels of blood glucose and liver glycogen in fasting and fed animals; determination of hormones by radioimmunoassay and enzymatic techniques; study of electrophoresis of blood proteins and hemoglobin; visual urine analysis; stool routine analysis; stone analysis; semen analysis; analysis techniques of cell pathology; examinations of microbial cultures; methods and keys of bacteria identification; antibiotics test methods; red blood cell tests (whole blood clotting time CT, bleeding time BT, hematocrit Hct, hemoglobin Hb, complete blood count CBC, erythrocyte sedimentation rate ESR); differential WBC test; sickle cell anemia test.	
Pre-requisite	ZOO 262	

ZOO 462	Experimental Parasitology	2 (1+0+1)
Content	Study of parasitism including topics on parasite biology, Biochemistry and ecology; Laboratory techniques including: experimental design, collection and treatment of the parasite and host samples and handling and identification of parasites; laboratory methods of infection for the assessment the preemptive protection against some parasitic antigens and the healing power of certain medications and biomaterials.	
Pre-requisite	ZOO 212	

ZOO 464	Biotechnology	2 (1+0+1)
Content	Definition of biotechnology; areas and methods of biotechnology; genetic engineering; applications of biotechnology in agriculture, medicine and industry; future prospects and potential risks of biotechnology.	
Pre-requisite	ZOO 424	

ZOO 465	Field Studies	5 (0+0+5)
Content	Introduction to the importance of field studies; theoretical and practical information on local animal groups in terms of classification and geographical distribution, environmental activity, pollutants of major concern to animal groups in their natural habitats; training students in the field or lab to distinguish between various environmental habitats (mountains, valleys, plains, beaches, dams, valleys) and to monitor daily animal activities; training of students on methods of collecting animal specimens, methods of recording	

	standard and descriptive information, photography and designing a final map for a selected location within work areas; discussing student results all through the training duration; preparation of reports, including the most important conclusions obtained by students during the field training.
Pre-requisite	Completion of 34 specialized credit hours

ZOO 466	Environmental Industrial Pollution	2 (1+0+1)
Content	Introduction; industrial pollution: sources, types and causes in the terrestrial and marine environments; chemical industries; heavy metals; sewage treatment; radioactive waste; pesticides and fertilizers; adverse effects of industrial pollution on the environment and wildlife; strategic control, standards and legislation; monitoring of industrial pollutants; prevention, reduction and removal of industrial pollution; industrial case studies: petrochemicals, fertilizers, and oil.	
Pre-requisite	ZOO 475	

ZOO 471	Animal Behavior	2 (1+0+1)
Content	Definition of behavior, types and importance; natural selection and behavior; environmental and behavioral adaptation; behavioral search for food; genetics and behavior; jealousy, instincts and behavior; group-living and behavior; animal cooperative and reproductive behavior; Social behavior; enemy resistance behavior; hormones and behavior; the nervous system and behavior; animal communication; learning and experience; intelligence and behavior regulation.	
Pre-requisite	ZOO 103	

ZOO 480	Wildlife Conservation	2 (2+0+0)
Content	Introduction; geographical distribution of animals; environmental balance; importance of animals in environmental balance; importance of wild animal conservation; causes of extinction of living organisms; methods of wildlife conservation; role of national and international organizations in the conservation of living organisms; legislation and regulations of the wildlife protection (locally and globally); wild animals on the Arabian peninsula (vertebrates and invertebrates); the current status of wildlife in Saudi Arabia; endangered species; nature reserves in Saudi Arabia; wildlife management.	
Pre-requisite	ZOO 373	

ZOO 481	Venomous Animals	2 (1+0+1)
Content	Biological study of the types of venomous animals and the structure of the venom gland; the chemical composition and impact of animal venoms on living organisms; prevention and treatment of poisoning; overview of the most important venomous animals in Saudi Arabia.	
Pre-requisite	ZOO 327	

ZOO 482	Organ Skills in Chordates	2 (1+0+1)
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Content	Study of several body organs such as skin, skeleton, heart, kidney, etc, in a group of chordates to demonstrate their functional skills so as to enable chordates to live in their environments with the least stress effect.
Pre-requisite	ZOO 326

ZOO 497	Applied Training in Zoology	2 (0+0 +4)
Content	<p>Hands on training students on various instruments, equipment and recent techniques in the specialized field. These equipment include:</p> <ul style="list-style-type: none"> - Polymerase Chain Reaction (PCR) - DNA Sequencer - DNA Microarray - Enzyme Linked Immune-Sorbent Assay (ELISA). Semen Analyzer - Micromanipulator <ul style="list-style-type: none"> • Acquiring skills of how to draw and record the scientific data • Training students on the appropriate routes to reach to the data base and various learning sources related to the specialized field of study • Preparing and writing down lab reports and how to draw conclusions recommendations. • Preparing and presenting the scientific results in an informative and simple way to the related audiences. 	

ZOO 498	Graduation Project	2 (1+0+1)
Contents	Use of scientific periodicals; search for information in various databases; designing and carrying out scientific experiments; data analysis; writing scientific reports.	
Pre-requisite	Finish at least 95 credit hours	

Completion of 95 or 100 credit hours