

Courses specification MSc

A Brief Description of the Master's Degree Courses (Thesis)

Requirements of the Master's Program in Zoology:

1) Compulsory hours (12 hours):

Zoo 500	Principles of Zoology	2 (1+1)
Experimental Design in Zoology	Contents: Animal surveys and censuses, concepts of sampling experimental animals, sampling units, random sampling techniques, use of random numbers for sampling experimental animals, methods of summarizing data and graphical representation of data, estimation, regression, correlation, contingency tables and the Chi square, analysis of variance, experimental design, methods of experimental design, growth and its estimation.	
Zoo 511	Principles of Zoology	2 (1+1)
Applied Entomology and Parasitology	Contents: A brief of arthropods and parasites of medical, veterinary, and economic importance, host-parasite relationships, methods of infection with parasites and parasitic arthropods, diseases of man and domestic economical animals caused by the various groups of parasites (protozoa, platyhelminthes and nematode arthropods as vectors of aetiological agents of diseases of man and domestic animals- mange, myiasis, allergy-), parasitic zoonoses, immunity against arthropods and parasitic infections, economical arthropods.	
Zoo 521	Principles of Zoology	2 (1+1)
Aquatic Animals	Contents: Advanced biology of aquatic vertebrates (mammals, reptiles, amphibians, birds, fishes) and invertebrates (mollusks, crustaceans, echinoderms) characteristics, phlogeny, classifications, reproduction, and geographical distributions.	
Zoo 531	Principles of Zoology	2 (1+1)
Advanced Animal Physiology	Contents: The importance of metabolic activities control in living organisms, molecular, biological, neural, hormonal and homeostatic controlling mechanisms in living organisms, co-ordination of body functions: interaction of cardiovascular functions, control of respiration, renal regulation of extracellular volume and osmolarity, regulation of K ⁺ , Ca ²⁺ , and H ⁺ concentration, regulation of gastrointestinal processes, regulation of organic metabolism and energy balance, regulation of reproductive processes.	
Zoo 543	Principles of Zoology	2 (1+1)
Cell and Tissue Biology	Contents: Biological membranes and their functions, the chemical nature of genetic material, the cellular and molecular basis of chromosomes, DNA replication, gene expression and its regulation in prokaryotes, cellular tissue contents of bone marrow, brain and kidneys, macrophages, mast cells and the general functions of these tissues.	

Zoo 571	Principles of Zoology	2 (2+0)
Animal Ecology and Pollution	Contents: Introduction, ecology of individuals: organisms limiting factors, important a biotic factors, dispread Population ecology; structure and diversity; biomass system population regulation, interspecific competition, community and ecosystem ecology: zoogeography, aquatic ecological zones in Saudi Arabia, ecological relationship between plankton and nekton in marine, fresh water and estuarine habitats, effects of ecological factors on aquatic animals and their media, aquatic community stratification, productivity, methods and measurements and primary productivity, pollution and pollutants, ozone layer pollution, heavy metals, oxides, sage and hydrocarbons pollution, pesticides and physical pollution.	

2) Elective Hours (12 hours):

Track 1: Animal Ecology and Pollution:

Zoo 572	Principles of Zoology	2 (2+0)
Animal Conservation	Contents:Ecological introduction, species and population characteristics, and ecological equilibrium, reasons behind species extinction, study of animals in Saudi Arabia (terrestrial and aquatic), the importance of animal conservation, endangered species, protected areas in Saudi Arabia, management of both terrestrial and aquatic animals.	

Zoo 573	Principles of Zoology	3 (2+1)
Advanced Ecology (1)	Contents:Characteristics of aquatic and terrestrial populations (natality rate, mortality rate, density, and age distribution), population growth, effect of abiotic factors on population growth (terrestrial and aquatic), species intra - and inter- relationships, population cycles, community changes, desert animal communities.	

Zoo 574	Principles of Zoology	2 (2+0)
Animal Zoogeography	Contents:Patterns of life, continental drift, theory, the zoo-bio-geo-graphic subdivisions of the earth, center of species dispersal and diffusion, island zoogeography, population dispersion (random, regular, and aggregational), population distribution (emigration, immigration, and migration), aquatic zoogeography of animal species in freshwater and marine ecosystems, bipolar animal species.	

Zoo 575	Principles of Zoology	3 (2+1)
Eco-physiology	Contents: Responses of different systems (respiratory, circulatory, and digestive systems of both vertebrates and invertebrates) to environmental factors, environmental factors effects on animals, quantitative analysis of energy exchange, thermo-regulation, water and osmo-regulation of animals.	

Zoo 576	Principles of Zoology	3(2+1)
Pollution Measurement Methods	Contents: Introduction and definition of the different polluting agents to measure pollution, utilization of some living organisms for measurement and estimation of pollution percentage, investigation of the factors that may affect the accuracy of aids utilized in measurement of the pollution agents, methods adopted for measurement of air and soil pollutants and determination of the international accepted pollution limits, study of some of the methods for measurement of pollutants in Saudi Arabia and the Gulf States and the limits of pollution in the Gulf States.	

Zoo 577	Principles of Zoology	3 (2+1)
Pollution in Animals	Contents: Introduction to pollution, pollution glossary, pollution and the food chains, the effect of pollution on animal physiology and distributions, selected studies on the effect of pollution on animals in Saudi Arabia and the Gulf States.	

Zoo 578	Principles of Zoology	2 (1+1)
Geographical Distribution of Pollutants	Contents: Introduction to pollution, quantitative and qualitative distribution of pollutants, statistical methods used in pollution distribution, the relationships between pollutant distribution, species diversity and equitability indices and animals distribution. pollution control as related to their geographical distribution.	

Zoo 579	Principles of Zoology	2 (2+0)
Selected Topics in Ecology and Pollution	Contents: Selection and discussion of recent research papers in ecology and pollution.	

Track 2: Cell Biology, Genetics, and Histology

Zoo 541	Principles of Zoology	3 (2+1)
Advanced Histo-Chemistry	Contents: Histochemical battery for detection and differentiation of carbohydrates, carboxylated and sulphated acid muco-substances as well as neutral muco-substances, enzyme histochemistry to detect and isolate various enzymes by different methods, methods for detection of different types of simple and conjugated lipids, histochemical techniques to detect minerals in human and animal tissues, immuno histochemical techniques.	

Zoo 542	Principles of Zoology	3 (2+1)
Advanced Cytology	Contents: A brief study of the concept of the cell, cell growth and division, cell synchronization, cell cycle regulation, cell chromatin structure and function, the structure of the chromosome, nucleic acids, DNA replication and repair.	

Zoo 544	Principles of Zoology	3 (2+1)
Advanced Histology	Contents:Histology of the immune system (lymph nodes, tonsils, spleen, thymus, bursa of fabricius), histology of the sense organs (ear, eye, taste buds), histology of the endocrine glands (thyroid, pituitary, adrenal glands), histology of the central nervous system.	
Zoo 546	Principles of Zoology	1 (1+0)
Advanced Techniques in Histology	Contents:Special techniques for preparation of sections of the eye, various parts of the central nervous system and sections of soft and hard bones. biological staining techniques in histology, histological preparation of museum specimens.	

Zoo 551	Principles of Zoology	3 (2+1)
Advanced Genetics	Contents: Mutations, recombination in bacteria, transposable of genetic material, genetic control of the immune response and cell division (oncogenes and proto-oncogenes), important studies in genetics such as the experiments of Lederberg and Tatum, Hershey and Chase, Melson and Stahl. Chargaff's Rules and Griffin experiments, Watson and Craig contributions in the discovery of the DNA structure.	

Zoo 552	Principles of Zoology	2 (1+1)
Quantitative and Population Genetics	Contents:Genetic structure of the population, forces of gene frequency changes, small populations, measurements of variability, resemblance between relatives, heritability, selection, inbreeding and cross breeding, Metric traits, BLUB estimation.	

Zoo 553	Principles of Zoology	2 (2+0)
Molecular Biology and Genetic Engineering	. Restriction enzymes, cloning vectors and cloning, construction of genomic, chromosome and cDNA libraries, identification of specific clones sequences in cDNA and genomic libraries, DNA sequence analysis, application of genetic engineering, hazards and problems of recombinant DNA technology and the possible techniques to minimize bio-hazards.	

Zoo 554	Principles of Zoology	3 (2+1)
Developmental Genetics	Contents:Short and long term regulations of gene expression and their mechanisms in eukaryotes, the differentiation of the egg and maternal influences on development, study of the developmental genetics of Drosophila sp., vertebrates and the general principles of abnormal development.	

Zoo 556	Principles of Zoology	2 (1+1)
Advanced Cytogenetics	Architecture of viral, prokaryotic and eukaryotic chromosomes, nature and consequences of altered chromosomal structure, sources and consequences involving chromosome number, Karyotype preparation,	

	banding chromosomal techniques, human chromosomes and the genetic maps.	
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Zoo 579	Principles of Zoology	2 (2+0)
Selected Topics in Cell Biology, Genetics, and Histology	Selection and discussion of recent scientific research papers in cell biology, genetics, and histology.	

Track 3: Physiology and Developmental Biology

Zoo 532	Principles of Zoology	2 (1+1)
Advanced Cell Physiology	Contents:A study of cells at the physiological level including the structure and function of organelles and membranes, enzymology, energy relationships and metabolic control, response to radiations, excitability and contractibility, the regulation of cell growth and differentiation.	

Zoo 533	Principles of Zoology	3 (2+1)
Physiology of Reproduction	Contents: Comparative anatomy and physiology of the reproductive system of higher vertebrates, reproductive cycle and reproductive hormones, puberty, gametogenesis, fertilization, implantation, prenatal growth, parturition and initiation of lactation, endocrine regulation of reproductive phenomena.	

Zoo 534	Principles of Zoology	2 (1+1)
Physiology of Hormones	Contents: Cellular and organismal action of hormones in vertebrates, regulation of hormones secretion, mechanism of action of hormones, hormones and blood sugar level, hormonal regulation of body fluids, regulation of calcium and phosphorus metabolism, hormonal regulation of metabolic rate, food intake and body composition and growth, hormonal regulation of reproduction, hormones and animal behavior, hormones homeostasis.	

Zoo 536	Principles of Zoology	2 (1+1)
Invertebrate physiology	Contents:A comparative study of invertebrate physiology including: nervous system, support and locomotion, endocrine system, respiratory system, circulatory system, digestive system, excretory system and reproductive system.	

Zoo 537	Principles of Zoology	3 (2+1)
Molecular Developmental Biology	Contents:The role of cytoplasm and nuclear contents in gametogenesis, physical and chemical changes and metabolism during fertilization and cell division, protein synthesis during cleavage, examples on the molecular development of oocytes in invertebrates, amphibians and mammals. inhibitors and exhibitors of cellular differentiation, relationship between cellular differentiation and cancer development.	

Zoo 538	Principles of Zoology	3 (2+1)
Advanced Descriptive and Experimental Embryology	Contents:Oocyte growth, the role and function of follicle cells, vitellogenesis, pinocytosis and phagocytosis during oocyte growth. Partenogenesis, control of number and size of cells during growth, the tissue growth after embryological stages, the role of embryonic organizers and induction experiments, embryonic tissue culture, radioactive labeling, artificial insemination and test tubes offspring.	

Zoo 539	Principles of Zoology	2 (1+1)
Selected Topics in Physiology and Development	Contents: Selected topics of interest in the field of physiology and development which will depend and focus on the subfield of study of each graduate student.	

Zoo 541	Principles of Zoology	3(2+1)
Advanced Histo-Chemistry	Contents:Histochemical battery for detection and differentiation of carbohydrates, carboxylated and sulphated acid muco-substances as well as neutral muco-substances, enzyme histochemistry to detect and isolate various enzymes by different methods, methods for detection of different types of simple and conjugated lipids, histochemical techniques to detect minerals in human and animal tissues, immuno histochemical techniques.	

Zoo 575	Principles of Zoology	3 (2+1)
Eco-Physiology	Contents: Responses of different systems (respiratory, circulatory, and digestive systems of both vertebrates and invertebrates) to environmental factors, environmental factors effects on animals, quantitative analysis of energy exchange, thermo-regulation, water and osmo-regulation of animals.	

Track 4: Entomology and Parsitology

Zoo 510	Principles of Zoology	3 (2+1)
Advanced Parasitology	. Contents:The concept of parasitism, comparison of the origin of parasitism, predation and other related animal associations, economic and social importance of parasites to be highlighted through the studies of specific examples of parasitic protozoa, helminthes and arthropods. methods of treatment of parasitic infections, control of parasitic infections.	

Zoo 512	Principles of Zoology	3 (2+1)
Physiology of Parasites	Contents:A study of the metabolism of carbohydrates, proteins, and lipids in various parasites. A study of enzyme systems of various parasites in relation to host infection. A study of the various physiological methods followed by parasites in the infection and establishment in the hosts. A study of the effects of parasites on their hosts, especially the competition between the parasites and their hosts for food and other vital substances, and the deleterious effects on the host immune system such as stimulation and inhibition. A study of the structure of systems of some parasitic helminthes, especially the digestive and reproductive systems. A study of the	

	general characteristic of teguments and other outer walls of various parasites.	
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Zoo 513	Principles of Zoology	3 (2+1)
Ecology of Insects	. Contents:Introduction to insect communities and their habitats. Zoo-geographical distribution of insects. A study of the various insect communities and their habitats with emphasis on the ecological factors affecting the prevalence and distribution of insects. Reproduction and life cycles of insects and their relationships to the insect bio-tops. The relationship between the insects feeding requirement and their habitat.	

Zoo 514	Principles of Zoology	3 (2+1)
Physiology of Insects	Contents:A comparative histological and physiological study on the digestive systems of two insects, a carnivorous insect and a sap-feeding one, together with a detailed study on the digestive enzymes, food needs and secretions of the salivary glands of each insect. A detailed study of chemo-coloration of insects. A detailed histological and physiological study of the central and the anatomic nervous systems of insects and their roles in physiology, especially in growth, reproduction and protein synthesis. A detailed histological study of insect blood cells. A physiological study of the blood volume in insects and the various methods used in measuring it. An experimental physiological study of metamorphosis in insects. A detailed study of the physiology of respiration in insects.	

Zoo 515	Principles of Zoology	3 (2+1)
Ecology of Parasites	. Contents:Types of parasites and hosts. The host as an environment for the parasite. A study of specific examples of the interactions of the various stages of parasites with their living environments (hosts), as well as the external environment. The zoogeography of parasites. Parasites as ecological control agents of hosts. A study of specific examples of parasites of terrestrial and aquatic animal hosts.	

Zoo 516	Principles of Zoology	3 (2+1)
Acarology	Contents:A review of the acari. The taxonomic status of ticks and mites. A morphological study of ticks and mites. The internal structures and physiology of the acari with special emphasis on hard ticks. Ecology of the acari. The classification of the acari (especially ticks) into families and genera with emphasis on species found in Saudi Arabia. The economic and medical importance of acari. Control of acari.	

Zoo 517	Principles of Zoology	2 (2+0)
Selected Topics in entomology and Parasitology	Contents: Entomology and parasitology bibliography and reference sources, reference indexing, writing up of research proposals, writing up of research papers.	

Zoo 518	Principles of Zoology	1 (1+0)
Advanced Techniques in Entomology or Parasitology	Contents: Students specializing in entomology will focus on the advanced entomological techniques, according to their specialization. Likewise, students specialized in parasitology will focus on the advanced parasitological techniques especially immune-parasitology, corresponding to their specialization.	

Track 5: Aquatic Animals

Zoo 522	Principles of Zoology	3 (2+1)
Advanced Ichthyology	Contents: Advanced phylogeny, classification, anatomy, physiological adaptation, reproductive strategies, relationships and diversification of fishes	

Zoo 523	Principles of Zoology	23(2+1)
Economic Aquatic Invertebrates	Contents: Advanced biology of aquatic invertebrates: their characteristics, anatomy, classification, phylogeny, reproduction, adaptations, and diversity.	

Zoo 524	Principles of Zoology	3 (2+1)
Fish Culture and Management	Contents: General principles of fish culture, common procedures of tilapia, catfish, and carps culture. Aquaculture economics.	

Zoo 525	Principles of Zoology	3 (2+1)
Economic Invertebrates Culture	. Contents: Natural histories, special requirements of culture and management of economically important invertebrates adaptable to artificial impoundments: prawn, lobster, crabs, oyster, and squid.	

Zoo 526	Principles of Zoology	2 (2+0)
Selected Topics on Aquatic Animals	Contents: Selected topics on research in aquatic animals.	

Zoo 527	Principles of Zoology	1 (1+0)
Standard Environmental Specifications for Aquatic Animals	Contents: To provide the students with the general test procedures to establish water quality criteria and tentative water quality criteria for temperature, dissolved oxygen, carbon dioxide, finely divided solid matter, manohydric phenols, pH, ammonia, chlorine, zinc, copper, and cadmium.	

Zoo 528	Principles of Zoology	2 (2+0)
Fishery Resources	Contents: Fisheries as a renewable natural resource. Its contribution to the food security of the nation, and its superiority to the other sources of animal proteins. Modern and recent methods of fisheries development and preservation. Laws of protection of the fisheries. The Saudi Arabian fisheries and its future. Aquaculture development to meet the demand for fish. Mariculture prospects for Saudi Arabia	

Zoo 600	Principles of Zoology	6 (6+0)
Thesis	Contents: The student conduct scientific research in one of the tracks and writes a dissertation under the supervision of a faculty member.	