Master of Science in Zoology (Courses Option)

Program Objectives:

1- To qualify students scientifically and practically in order to fulfill their duties upon graduation in various scopes of knowledge.

2- To provide eligible scientific cadres able to participate in the scientific progress in the kingdom.

3- To improve the efficiency of the employees in the governmental sectors by getting acquainted with the latest aspects of the scientific progress

Admission Requirements:

1) The admission requirements enumerated in the 15th article of the unified law organizing the graduate studies in Saudi universities.

2) The candidate must obtain B.Sc. degree in Zoology from KSU or equivalent university.

3) The candidate must pass successfully the interview held by the supervising committee.

Degree requirements:

A. Successful completion of a 42 credit hours of graduate courses distributed as follows:

1- 34 credit hours from the core Courses (If applicable) .

2- 8 credit hours from the elective Courses (If applicable).

Program Structure:

Course No. & Code	No. of Courses	No. of units
	15 Compulsory courses	30
	(3-6) elective courses	8
Zoo 599	Research project	4
Total		

Courses distribution

First Level

Course code	Course title	Credit hrs.
Zoo 511	Applied Entomology and Parasitology	2 (1+0+1)
Zoo 521	Aquatic Animals	2 (1+0+1)
Zoo 531	Advanced Animal Physiology	2 (1+0+1)
Zoo 543	Cell and Tissue Biology	2 (1+0+1)
Zoo 556	Advanced Cytogenetics	2 (1+0+1)
Zoo 571	Animal Ecology and Pollution	2 (1+0+1)

Second Level

Course code	Course title	Credit hrs.
Zoo 519	Medical Entomology	2 (1+0+1)
Zoo 520	Common Parasites of Animal and Man	2 (1+0+1)
Zoo 529	Fish Culture	2 (1+0+1)
Zoo 534	Physiology of Hormones	2 (1+0+1)
Zoo 553	Molecular Biology and Genetics	2 (2+0+0)
Zoo 580	Advanced Animal Ecology	2 (1+0+1)

Third Level

(A) 6 Compulsory Units

Course code	Course title	Credit hrs.
Zoo 528	Fishery Resources	2 (2+0+0)
Zoo 561	Embryonic Development	2 (1+0+1)
Zoo 581	Advanced Pollution	2 (1+0+1)

(B) 6 Optional Units

Course code	Course title	Credit hrs.
Zoo 500	Experimental Design in Zoology	2 (1+0+1)
Zoo 516	Acarology	3 (2+0+1)
Zoo 518	Advanced Techniques in Entomology or Parasitology	1 (0+0+1)
Zoo 523	Economic Invertebrates	2 (1+0+1)
Zoo 524	Advanced Ichthyology	2 (1+0+1)
Zoo 527	Standard quality for Aquatic Environment	1 (0+0+1)
Zoo 541	Advanced Histochemistry	3 (2+0+1)
Zoo 546	Advanced Techniques in Histology	1 (0+0+1)
Zoo 552	Quantitative and Population Genetics	2 (1+0+1)
Zoo 560	Advanced Biotechnology	2 (1+0+1)
Zoo 562	Reproductive physiology and Artificial Insemination	2 (1+0+1)
Zoo 563	Physiological Immunology	2 (1+0+1)
Zoo 564	Recent Techniques in Embryology	2 (1+0+1)
Zoo 565	Immunoparasitology	2 (1+0+1)
Zoo 584	Animal Diversity in Saudi Arabia	2 (2+0+0)
Zoo 585	Ecophysiology	2 (1+0+1)
Zoo 586	Advanced Animal Behavior	2 (1+0+1)
Zoo 597	Selected Topics in Zoology	1 (1+0+0)
Zoo 598	Seminar	1 (1+0+0)

Fourth Level

Course code	Course title	Credit hrs.
	The student choses two optional units from the previous list provided that they pertaining to his specialization	2
Zoo 599	Research project	4 (0+0+4)

Courses description

Zoo 500	Experimental Design in Zoology	2 (1+0+1)
	Animal surveys and censuses, concepts of experimental animal sampling, animal experimental population, random sampling methods and the conditions under which they are used, advantages and disadvantages. Methods of summarizing animal data, graphical representation of date, estimation. Regression, correlation, contingency tables and the Chi-Square, analysis of variance, and experimental design Growth and its estimation	

Zoo 511	Applied Entomology and Parasitology	2 (1+0+1)
	A review 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 animals caused by the various groups of parasites (Protozoa, platyheminthes and nematode Arthropods as vectors of aetiological agents of diseases of man and domesticated animals. (Mange, myiasis, allergy). Parasitic zoonosis. Immunity against arthropod and parasitic infections Economical arthropods.	

Zoo 516	Acarology	3 (2+0+1)
	A review of Acari the taxonomic status of ticks and mites. A morphological study of ticks and mites. The internal structures and physiology of Acari with special emphasis on hard ticks. Ecology of Acari. The classification of 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 518	Advanced Techniques in Entomology or Parasitiology	1 (0+0+1)
	Students specializing in entomology will study the advanced entomological techniques, each according to his specialization. Likewise, students specialized in parasitology will study the advanced parasitological techniques especially immunoparasitological, one each according to his or her specialization	

Zoo 519	Medical Entomology	2 (1+0+1)
	Studying the feeding organs of disease-transmitting insects and other Arthropods (mouth parts, structure and function of digestive system and feeding mechanism). Studying disease-transmitting insects and other Arthropods: Experimental, Transmission, Relationship between the pathogen, vector and host. Response of vertebrate host to insect-transmitted pathogens. Insect-transmitted diseases of wild animals. Studying insect different mechanisms of diseases transmission: Mechanical, Biological, Transovarial, and Propagative Transmission. Studying Myiasis that caused by insect to vertebrate hosts.	

Zoo 520	Common Parasites of Animals and Man	2 (1+0+1)
	Understanding of relationships between environmental and biotic factors that affect transmission of parasites between Man and domesticated animals. Study of the histopathological effects and diseases of these parasites on the infected hosts. Factors that help control and maintain of the environmental health.	

Zoo 521	Aquatic Fauna	2 (1+0+1)
	Introduction and general characteristics of Aquatic fauna, Classification and systematic relationships, Examples of reproduction in some aquatic animals, Geographical distribution of the following groups: Molluscs, Echinodermats, Crustaceans, Fishes, Amphibians, Reptiles, Birds and Mammals.	

Zoo 523	Economic Invertebrates	2 (1+0+1)
	Introduction, Classification, Advanced Biological studies including: Morphology, Anatomy, Reproduction and Geographical distribution of some chosen examples.	

Zoo 524	**Advanced Ichthyology**	**2 (1+0+1)**
	Introduction, Classification, Biological and anatomical studies, Aquatic environment and relationships between fish groups, physiological studies (adaptations), Reproduction and life cycle.	

Zoo 527	**Standard Quality for Aquatic Environments**	**1 (0+0+1)**
	Introduction, Characteristics of aquatic environment, Standard measurements including: Temperature, Dissolved oxygen, Carbon dioxide, Salinity, pH, Ammonia and Heavy metals.	

Zoo 528	Fishery Resources	2 (2+0+0)
	Introduction, Fisheries and food security, Development of fisheries, Importance and superiority of fish protein, Fisheries of Saudi Arabia, Present and future.	

Zoo 529	Fish Culture (Fish Farming)	2 (1+0+1)
	Introduction of fish culture, Economic importance of aquaculture, Requirements of fish culture, types of aquaculture, Chosen examples of cultivated fish's including: Tilapia, Carp and Catfish.	

Zoo 531	Advanced Animal Physiology	2 (1+0+1)
	The importance of control in living systems, molecular control mechanisms; biological control systems: homeostatic, neural and hormonal control mechanisms; coordination of body function: integration of cardiovascular function, control of respiration, renal regulation of extracellular volume and osmolarity, regulation of K^+ , Ca^{++} and H^+ concentration, regulation of gastrointestinal processes, regulation of organic metabolism and energy balance, regulation of the reproductive process.	

Zoo 534	Physiology of Hormones	2 (1+0+1)
	Cellular and organism action of hormones in vertebrates. Regulation of hormone secretion, mechanism of action of hormones, hormones and blood sugar, hormone regulation of body fluids, regulation of calcium and phosphorus metabolism, hormonal regulation of metabolic rate, food intake, body composition and growth, Hormones and animal behavior, hormones and homeostasis.	

Zoo 541	Advanced Histochemistry	3 (2+0+1)
	Histochemical methods for detecting and differentiating of the various types of carbohydrates especially neutral mucosubstances, sialomucins, sulfomucins; conjugated and non-conjugated carbohydrates. Histochemical methods for detecting enzymes. Histochemical methods for detecting neutral lipids, phospholipids, saturated and unsaturated lipids, cholesterol and the histochemical tools to differentiate between simple and compound lipids. Metal detection by histochemical techniques. Immunohistochemical methods.	

Zoo 543	Cell and Tissue Biology	3 (2+0+1)
	Biological membranes and their functions, the chemical nature of the genetic material, cellular and molecular basis of chromosomes, DNA replication, gene expression and its regulation in prokaryotes, cellular and tissue contents of bone marrow, brain and kidney macrophages, mast cells and the general functions of these tissues.	

Zoo 546	Advanced Techniques in Histology	1 (0+0+1)
	Special techniques for preparation of sections of the eye, parts of the central nervous system, and soft and hard bones. Biological staining techniques used in histology, Section preparations of museum specimens.	

Zoo 552	Quantitative and Population Genetics	2 (1+0+1)
	Genetic structure of populations, forces of gene frequency changes, small populations, measurements of variation, resemblance between relatives, heritability, selection, inbreeding and crossbreeding, metric traits. BLUP estimation.	

Zoo 553	Molecular Biology and Genetic Engineering	2 (2+0+0)
	Restriction enzymes, cloning vectors and cloning, construction of genomic, chromosome and cDNA libraries, identifying specific cloned sequences in cDNA and genomic libraries, DNA sequence analysis , applications of genetic engineering, hazards and problems of recombinant DNA technology and the possible techniques to minimize biohazards.	

Zoo 556	Advanced Cytogenetics	2 (1+0+1)
	Architecture of viral, prokaryotic and eukaryotic chromosomes, nature and consequences of altered chromosomal structure, sources and consequences involving chromosome number karyotype preparation banding techniques, human chromosomes and the genetic maps.	

Zoo 560	Advanced Biotechnology	2 (1+0+1)
	Monoclonal polyclonal antibody drugs, drug delivery and gene therapy. Animal Biotechnology: Cloning livestock, crop biotechnology, and food biotechnology. Recombinant DNA technology, embryonic stem cells, and therapeutic cloning Genetic information nondiscrimination Act (GINA), social responsibility of biotechnology. Human genome project and genomics.	

Zoo 561	Embryonic Development	2 (1+0+1)
	The role of cytoplasm and nuclear contents in gametogenesis and fertilization Oocyte growth and the role and function of follicle cells, vitellogenesis, Pinocytosis and phagocytosis during oocyte growth control of number and size of cells during growth, tissue growth after embryological stages, the role of embryonic organizers and induction experiments, embryonic tissue culture.	

Zoo 562	Reproductive Physiology and Artificial Insemination	2 (1+0+1)
	The structure of reproductive system in higher vertebrates, reproductive cycles and their hormonal regulation, seasonality of reproduction, Sprmatoginc waves and cycles. The basic steps for performing. Artificial insemination (A. I.). The role of A. I. in improving animal production.	

Zoo 563	Physiological Immunology	2 (1+0+1)
	Regulation of immune responses and effectors mechanisms. Molecular regulation of MHC and immunoglobulin production, their types and classes. Functions and types of B and T cell receptors and CD molecules. Regulation of cytokine production by T lymphocyte and some non-lymphocyte. Physiological mechanisms involved in tumors, primary and secondary immunodeficiency and types of hypersensitivity.	

Zoo 564	Recent Techniques in Embryology	2 (1+0+1)
	Migration of primordial germ cells, In vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), production of test tube babies, embryo culture and development, cloning and identical twins production, chimera, establishment of stem cells and developments, Cryopreservation of gametes and embryos, genome banks.	

Zoo 565	Immunoparasitology	2 (1+0+1)
	Study of the relations between various parasites and the immune system against them. Topics covered are Malaria, Trypanosomiasis, Leishmaniasis, Schistosomiasis and other gastrointestinal parasites.	

Zoo 571	Animal Ecology and Pollution	2 (1+0+1)
	Introduction, ecology of individuals: organisms limiting factors, important abiotic factors, dispread population Ecology; structure and diversity; Biomass system Population regulation, interspecific competition. Community and Ecosystem ecology: zoogeography aquatic ecological zones and ecosystems in Saudi Arabia. Effects of ecological factors on aquatic animals and their media. Aquatic community stratification. Productivity, Ozone layer pollution, Heavy metals, oxides, sewage and hydrocarbons pollution. Pesticides and physical pollution.	

Zoo 580	Advanced Animal Ecology	2 (1+0+1)
	Characteristics of aquatic and terrestrial animal populations (natality rate, density, age distribution). Population growth, effect of abiotic factors on population growth (aquatic & terrestrial) species intra-and inter-relationships. Desert animal communities Aspects of modifications & adaptations of body structures of some desert animals. Ecosystem conservation.	

Zoo 581	Advanced Pollution	2 (1+0+1)
	Pollution & pollutants, physical: particles, gases, ozone layer, radiations and noise chemical pollution: heavy metals, oil, pesticides, sewage; organic and biological pollution; hydro-pollution; food pollution. Pollution in the G. C. C. states.	

Zoo 584	Animal Diversity in Saudi Arabia	2 (2+0+0)
	Introduction, Plate tectonic and the formation of the Arabian Peninsula. The origin of the animal groups in Arabia. Terrestrial and Aquatic habitats, Animal diversity (Mammals, Birds, Reptiles, Amphibians and Invertebrates). Status of Animal groups. Conservation of wild life. Protected areas. Laws and systems. Movements and NGO.	

Zoo 585	Ecophysiology	2 (1+0+1)
	Responses of different systems to environmental factors including respiration, circulation and digestion of vertebrae and invertebrate animals- Responses of vertebrate and invertebrates various systems to changes in environmental factors. Quantitative analysis of energy exchange and respiration. Thermoregulation, water, osmoregulation and excretion.	

Zoo 586	Advanced Animal Behavior	2 (1+0+1)
	Introduction to animal behavior and types of behavior. Meaning of behavior. Ecology and adaptive behavior. Foraging behavior and different regulations. Instinctive behavior. Sexual behavior and cooperative breeding. Social behavior and aggression behavior and different regulations. The role of Hormones in behavior. Learning and experience and intelligence and Pavlov experiments. Ethopharmacology and different regulations. The role of animal behavior in Biomedical studies. The role of nervous system in behavior.	

Zoo 597	Selected Topics in Zoology	1 (1+0+0)
	The student showed be able to look for related information to his field in some of Zoology branches such as histology, cytology, physiology, Embryology, genetics, Ecology or classification in vertebrates or invertebrates.	

Zoo 598	Seminar	1 (1+0+0)
	The student should obtain and gather the Scientific materials in his area of study, then give presentation including discussion with the interested staff members and postgraduate students.	

Zoo 599	Research Project	4 (0+0+4)
	This course aims at training students on designing and executing research experiments, recording, analyzing, and discussing date giving scientific explanations, then offering a presentation in a scientific meeting.	