٠٦: قسم علم الحيوان - الخطط الدراسية لبرامج الدراسات العليا.

البرامج	الكود		الدرجة	
	ع	E	ع	E
١. الحيوان العلم ٢. فسيولوجيا الحيوان ٣. التقنية الحيوية الحيوانية ٤. التحاليل البيولوجية ٥. حماية البيئة	ح٥٠٠	Z500	دبلوم	Diploma
١. فسيولوجيا الحيوان ٢. علم بيولوجيا الخلية والأنسجة والوراثة والبيولوجيا الجزيئية ٣. التشريح والأجنة ٤. بيولوجيا الفقاريات والتطور ٥. بيولوجيا اللافقاريات ٦. علم البيئة ٧. علم المناعة والطفيليات ٨. إستزراع اللافقاريات ٩. علم الحشرات ١٠. علم السموم ١١. بيولوجيا الأمراض المعدية	ح٦٠٠	Z600	ماجستير	M.Sc.
١. فسيولوجيا الحيوان ٢. علم بيولوجيا الخلية والأنسجة والوراثة والبيولوجيا الجزيئية ٣. التشريح والأجنة ٤. بيولوجيا الفقاريات والتطور ٥. بيولوجيا اللافقاريات ٦. علم البيئة ٧. علم المناعة والطفيليات ٨. علم الحشرات ٩. علم السموم ١٠. بيولوجيا الأمراض المعدية	ح٧٠٠	Z700	دكتوراه	Ph.D.

أولاً: الخطة الدراسية لبرامج الدبلوم:

الكود		عدد المقررات	نوع المقرر	الساعات المعتمدة
ع	E			
ح٥٠٠	Z500	٥	إجباري	١٠
		٥	إختياري	١٠
العدد الكلي للساعات المعتمدة				٢٠

١. الساعات الإجبارية: يدرس الطالب ١٠ ساعات معتمدة موزعة على فصلين دراسيين بواقع ٦ساعات معتمدة في الفصل الدرلسي الأول و ٤ساعات معتمدة في الفصل الدرلسي الثاني.
٢. الساعات الاختيارية: يختار الطالب ١٠ ساعات معتمدة موزعة على فصلين دراسيين بواقع ٤ساعات معتمدة في الفصل الدرلسي الأول و ٦ساعات معتمدة في الفصل الدرلسي الثاني.

١. المقررات الدراسية لدرجة الدبلوم تخصص الحيوان العام.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	المعتمدة	إجباري	اختياري
الأول	٥٠١ح	بيولوجيا الخلايا الجذعية	٢	-	٢	√	-
	٥٠٣ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٥٠٥ح	فسيولوجيا اللافقاريات	١	٢	٢	√	-
	٥٠٧ح	بيولوجيا اشعاعية	٢	-	٢	-	√
	٥٠٩ح	علم أمراض الأنسجة (باثولوجي)	١	٢	٢	-	√
	٥١١ح	وراثة خلوية (١)	٢	-	٢	-	√
	٥١٣ح	احصاء حيوى تطبيقى	٢	-	٢	-	√
الثاني	٥٠٢ح	التنوع البيئى	١	٢	٢	√	-
	٥٠٤ح	ناقلات الامراض	٢	-	٢	√	-
	٥٠٦ح	اساسيات الميكروبيولوجى	٢	-	٢	-	√
	٥٠٨ح	أساسيات المجهر الإلكترونى	٢	-	٢	-	√
	٥١٠ح	علم التطور	٢	-	٢	-	√
	٥١٢ح	فحوص معملية (١)	١	٢	٢	-	√
	٥١٤ح	علم السموم	٢	-	٢	-	√
	٥١٦ح	معلوماتية حيوية	٢	-	٢	-	√

٢. المقررات الدراسية لدرجة الدبلوم تخصص فسيولوجيا الحيوان.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	المعتمدة	إجباري	اختياري
الأول	٥٠١ح	بيولوجيا الخلايا الجذعية	٢	-	٢	√	-
	٥٠٥ح	فسيولوجيا اللافقاريات	٢	-	٢	√	-
	٥١٥ح	فسيولوجيا الدم وأمراض الدم (١)	٢	-	٢	√	-
	٥٠٧ح	بيولوجيا اشعاعية	٢	-	٢	-	√
	٥١٣ح	احصاء حيوى تطبيقى	٢	-	٢	-	√
	٥١٧ح	فسيولوجيا الغدد الصماء	٢	-	٢	-	√
	٥١٩ح	فسيولوجى جزيئى	٢	-	٢	-	√
الثاني	٥١٨ح	علم الإنزيمات	٢	-	٢	√	-
	٥٢٠ح	إختلالات وظيفية	٢	-	٢	√	-
	٥٠٦ح	اساسيات الميكروبيولوجى	٢	-	٢	-	√
	٥١٢ح	فحوص معملية	٢	-	٢	-	√
	٥١٤ح	علم السموم	٢	-	٢	-	√
	٥٢٢ح	فسيولوجيا التسمم (١)	٢	-	٢	-	√
	٥٢٤ح	بيولوجيا الأورام (١)	٢	-	٢	-	√

٣. المقررات الدراسية لدرجة الدبلوم تخصص التقنية الحيوية الحيوانية.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	المعتمدة	إجباري	اختياري
الأول	٥٠١ح	بيولوجيا الخلايا الجذعية	٢	-	٢	√	-
	٥٠٣ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٥٢١ح	وراثة و وراثة فوقية	٢	-	٢	√	-
	٥٠٧ح	بيولوجيا اشعاعية	٢	-	٢	-	√
	٥١٣ح	احصاء حيوى تطبيقى	٢	-	٢	-	√
	٥٢٣ح	هندسة وراثية	٢	-	٢	-	√
	٥٢٥ح	علم الجينوم والبروتيوم (١)	٢	-	٢	-	√
الثاني	٥١٦ح	معلوماتية حيوية	٢	-	٢	√	-
	٥٢٦ح	بيولوجيا الأمراض الوراثية	٢	-	٢	√	-
	٥٠٦ح	اساسيات الميكروبيولوجى	٢	-	٢	-	√
	٥٢٤ح	بيولوجيا الأورام	٢	-	٢	-	√
	٥٢٨ح	بيولوجيا جزيئية تطبيقية	٢	-	٢	-	√
	٥٣٠ح	مناعة خلوية و جزيئية	٢	-	٢	-	√
	٥٣٢ح	كمياء المناعة	٢	-	٢	-	√

٤. المقررات الدراسية لدرجة الدبلوم تخصص التحاليل البيولوجية.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	المعتمدة	إجباري	اختياري
الأول	٥٠١ح	بيولوجيا الخلايا الجذعية	٢	-	٢	√	-
	٥٠٣ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٥١٥ح	فسيولوجيا الدم وأمراض الدم	٢	-	٢	√	-
	٥٠٩ح	علم أمراض الأنسجة (باثولوجى)	١	٢	٢	-	√
	٥١٧ح	فسيولوجيا الغدد الصماء	٢	-	٢	-	√
	٥٢٧ح	ميكروبيولوجيا تطبيقية	٢	-	٢	-	√
	٥٢٩ح	التسمم الميكروبى	٢	-	٢	-	√
الثاني	٥٠٦ح	اساسيات الميكروبيولوجى	٢	-	٢	√	-
	٥١٢ح	فحوص معملية	١	٢	٢	√	-
	٥٠٨ح	أساسيات المجهر الإلكترونى	٢	-	٢	-	√
	٥١٤ح	علم السموم	٢	-	٢	-	√
	٥٢٦ح	بيولوجيا الأمراض الوراثية	٢	-	٢	-	√
	٥٣٢ح	كمياء المناعة	٢	-	٢	-	√
	٥٣٤ح	كيمياء الأنسجة (١)	٢	-	٢	-	√

٥. المقررات الدراسية لدرجة الدبلوم تخصص حماية البيئة.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	المعتمدة	إجباري	اختياري
الأول	٥٣١ح	البيئة المائية	٢	-	٢	√	-
	٥٣٣ح	ادارة المحميات الطبيعية	٢	-	٢	√	-

	٥٣٥ح	معالجة التلوث البيئى	٢	-	٢	√	-
	٥٠٣ح	بيولوجيا جزيئية	٢	-	٢	-	√
	٥٠٧ح	بيولوجيا اشعاعية	٢	-	٢	-	√
	٥١٣ح	احصاء حيوى تطبيقى	٢	-	٢	-	√
	٥٣٧ح	التلوث البيئى	٢	-	٢	-	√
	٥٣٩ح	أسس الادارة البيئية والاقتصاد	٢	-	٢	-	√
الثاني	٥٠٢ح	التنوع البيئى	٢	-	٢	√	-
	٥٠٦ح	اساسيات الميكروبيولوجى	٢	-	٢	√	-
	٥١٤ح	علم السموم	٢	-	٢	-	√
	٥١٦ح	معلوماتية حيوية	٢	-	٢	-	√
	٥٣٦ح	تقدير التنوع الاحيائى فى المياه العذبة (١)	٢	-	٢	-	√
	٥٣٨ح	تسمم الأغذية (١)	٢	-	٢	-	√
	٥٤٠ح	دراسات مقدمة فى الطب الشرعى	٢	-	٢	-	√

المحتوى العلمي للمقررات الدراسية لبرامج الدبلوم

٥٠١ح: بيولوجيا الخلايا الجذعية Z501: Stem Cell Biology

The course covers a brief history of the field, cell potency and different cell linages. It also describes research on animal models, tissue engineering, and the political and ethical issues related to stem cell technology.

٥٠٢ح: التنوع البيئى Z502: Ecological Diversity

The course covers distribution of different animal phyla in different ecosystems, factors affecting speciation and range shift. Sympatric vs allopatric and parapatric speciation. Ecosystem dynamics and equilibrium. Ecosystem management and anthropogenic threats.

٥٠٣ح: بيولوجيا جزيئية Z503: Molecular Biology

The course covers gene structure in prokaryotes and eukaryotes. Molecular mechanisms of DNA replication, repair, transcription, protein synthesis, gene regulation, and chromatin structure and function in different organisms. RNA polymerase dynamics and regulation of gene expression will be discussed. Basic molecular techniques and experiments will be practiced.

٥٠٤ح: ناقلات الامراض Z504: Biological Vectors

The course covers the general concepts of biological vectors, vector classes and vector biology, developmental cycle of selected pathogens in their vectors, pathogen-vector interaction, final host-vector relationships, and vector control

٥٠٥ح: فسيولوجيا اللافقاريات Z505: Invertebrates Physiology

The course covers osmoregulation, respiration, digestion, sensation, excretion, metabolism and energy production and expenditure in selected invertebrate phyla.

Z506: Essentials in Microbiology **٥٠٦ح: اساسيات الميكروبيولوجى**

The course covers different methods of disinfection, sterilization, biosafety, culturing and culture media. Basic structure and taxonomy of bacteria, fungi and viruses. Serological, biochemical and molecular identification and typing of bacteria, fungi and viruses will be discussed.

Z507: Radiobiology **٥٠٧ح: بيولوجيا اشعاعية**

The course covers the biological responses of animals as well as human beings to ionizing and non-ionizing radiations. It describes different mechanisms and pathways involved in animal responses on cellular, subcellular and molecular levels. Also, role of radiation in induction of cancer, malformation and mutagenesis will be addressed. Relative risk and benefits of radiation usage are considered.

Z508: Fundamentals of Electron Microscopy **٥٠٨ح: أساسيات المجهر الإلكترونى**

The course covers the different types of electron microscopes. Application of EM in life and basic sciences. Samples processing including fixation, sectioning, visualization and imaging. Quality control of electron microscopy preparations and outputs.

Z509: Pathology **٥٠٩ح: علم أمراض الأنسجة**

The course covers general concepts on cell injury, disturbance in cell metabolism and growth as well as haemodynamics. Also, it describes the fundamentals of apoptosis, inflammation, necrosis, cirrhosis fibrosis and gangrene. Differentiation of benign tumors and neoplasia as well as different types of tissue reactions will discussed. Also, immunopathology will be addressed.

Z510: Evolution **٥١٠ح: علم التطور**

The course covers various theories in evolution. Evolutionary evidences from comparative anatomy, embryology, physiology, taxonomy and molecular biology. Geological time chart and related issues will be described.

Z511: Cytogenetics (1) **٥١١ح: وراثة خلوية (١)**

The course describesmeiosis and mitosis, cell cycles, chromosome banding, chromosomal aberrations and the differences in number and structure of chromosomes in animal phyla. Various techniques and applications utilized in cell cycle detection will be covered.

Z512: Laboratory Investigations (1) **٥١٢ح: فحوص معملية (١)**

The course covers human samples preparationand analyses including urine and stool analyses, blood analyses, serological and molecular analyses, in both health and disease condition.Also, laboratory safety measures and dealing with harmful or genetically modified organisms will be mentioned.

Z513: Biostatistics **٥١٣ح: إحصاء حيوي تطبيقي**

The course covers the different types of experiments, methods of tabulation, manipulation and analysis of experimental data. Also, statistical concepts and models will be discussed. Application of statistical software including SPSS will be practiced.

Z514: Toxicology **٥١٤ح: علم السموم**

The course covers the fundamental concepts on the toxicosis, toxicant classes including corrosives, metallic poisons, heavy metals, pesticides, insecticides, muolluscides, animal poisoning, volatile gases poisoning, mycotoxicosis, poisonous plants, irradiation and their occurrence and mechanism of action. Also, it covers factors affecting xenobiotics, mode of action and defense responses.

Z515: Blood Physiology and Blood Diseases (1) **٥١٥ح: فسيولوجيا الدم وأمراض الدم (١)**

The course covers the basics of blood cells types and percentages in health and disease, hematopoiesis and hematopoietic tissues, hemoglobin carrying capacity, hemoglobin structure and functions and hematopoietic disorders.

Z516: Bioinformatics **٥١٦ح: معلوماتية حيوية**

The course covers gene and protein sequences analysis including detection of open reading frames, sequence alignments, protein structure prediction, helix-turn-helix, transmembrane prediction, and molecular modeling and analysis. In silico recombinant DNA formation, restriction enzyme analysis as well as primer design will be discussed.

Z517: Endocrinology **٥١٧ح: فسيولوجيا الغدد الصماء**

The course describes role and regulation of hormonal system associated with development, energy production and utilization, haemostasis, homostasis, growth and reproduction. Also, it covers hormonal coordination, and endocrine related diseases.

Z518: Enzymology **٥١٨ح: علم الإنزيمات**

The course covers organization, classification and nomenclature of enzymes. Enzymes, specificity, kinetics and regulation of enzymatic reactions.

Z519: Molecular Physiology **٥١٩ح: فسيولوجى جزيئى**

The course deals with the molecular characteristics of different types of muscle function, molecular mechanisms of conduction, action potential, neurotransmission at synapses and neurotransmitters. It covers molecular basis of hormonal regulation and transmembrane transportation and signal transduction.

Z520: Physiological Disorders ٥٢٠ح: إختلالات وظيفية

The course covers physiological homostasis and disorders. It emphasizes disorder patterns of diabetes, coronary heart disease, stroke, hypertension, Parkinson's disease, Alzheimer's disease, motor neuron disease, multiple sclerosis, rheumatoid arthritis, osteoporosis, inflammatory bowel diseases. It describes disorders related to nutrients deficiency. Molecular basis of above mentioned disorders will be addressed.

Z521: Genetic and Epistatic Interaction ٥٢١ح: وراثة ووراثة فوقية

The course describes the Function of proteins, interaction of alleles and genes in phenotype production, epistasis: what's in a name, Differing perspectives on gene interactions, Epistatic Relationships Involving Two Genes complementation tests, Epistasis in human health and disease and Epistasis and the path of evolutionary change will be described.

Z522: Physiology of Toxicity (1) ٥٢٢ح: فسيولوجيا التسمم (١)

The course covers the majortypes of poisons in terms of potential exposure routs, mechanism of action, detection and quantitation as well as symptoms of toxicity in different animals. Enzymes level and gene expression in corresponding to toxicity will be described.

Z523: Genetic Engineering ٥٢٣ح: هندسة وراثية

The course covers fundamental concepts of gene technology, common biotechnology techniques, transgenic animal production, recombinant microorganisms and protein production. Also, biosafety of genetically modified organisms will be discussed.

Z524: Cancer Biology (1) ٥٢٤ح: بيولوجيا الأورام (١)

The course describes how cancer arises and develops at the molecular and cellular level. It explains genetic alterations implicated in tumor formation, distinguish alterations in oncogenes and tumor suppressor genes, compare and contrast cell cycle regulatory mechanisms as well as cell death in normal and tumor cells, describe how cancer grows and spreads. Also, distinguish between tumorigenesis, angiogenesis, and metastasis.

Z525: Genomics and Proteomics (1) ٥٢٥ح: علم الجينوم و البروتيوم (١)

The course introduces students to genomes, proteomes and databases that store various data about genes, proteins, genomes and proteomes. The main objective is to organize the large amount of

information about genomics, proteomics and bioinformatics and offer basic knowledge of genome sequencing, major differences between prokaryotic and eukaryotic genomes, basic proteomics and its applications, basics in bioinformatics, comparative and evolutionary genomics and applications.

Z526: Biology of Genetic Diseases **٥٢٦ح: بيولوجيا الأمراض الوراثية**

The course covers the chromosomal analysis, chromosomal aberrations, molecular cytogenetics-mutations-mutagens and mutagenesis, autosomal recessive and x-linked disorders-twin studies-family clusters as well as marker associations models (cancer- diabetes and infectious diseases.

Z527: Applied microbiology **٥٢٧ح: ميكروبيولوجيا تطبيقية**

The course covers the common topics of microbial technology including fermentation and bioreactors. Also, it covers utilization and application of microbes in different products and processes in industry, environment, aquaculture and agriculture. Common application methods including production of beverage, antimicrobial, biofuel, biodegradation and wastewater treatment will be discussed.

Z528: Applied molecular biology **٥٢٨ح: بيولوجيا جزيئية تطبيقية**

The course covers the different types of molecular vectors, transformation, transfection and detection of gene products. Also, it covers concepts of agarose gel electrophoresis, nucleic acid purification and quantification, DNA restriction digestion and analysis, Southern hybridization, library construction, and basics of computer-based DNA sequence analysis.

Z529: Microbial poisoning **٥٢٩ح: التسمم الميكروبى**

The course describes toxin producing microorganisms in food and food products. Risk of toxicosis in stored food, animal food, bevarage, drinking water, and surface water. Description of standard methods of detecting and quantification of such microorganisms and their toxins.

Z530: Cellular and molecular immunology **٥٣٠ح: مناعة خلوية و جزيئية**

The course covers the general concepts on cell mediated immunity, different types of hypersensitivity reactions, role of T cell subsets, cell receptors, histocompetability molecules, as well as activation and regulation of immune-related gene superfamilies in case of health, disease and infection. Also, cellular and molecular basis of cell mediated abnormalities will be discussed.

Z531: Aquatic ecosystem **٥٣١ح: البيئة المائية**

The course covers fundementals of different aquatic compartments including lakes, reservoirs, rivers and sea water. It describes food chains and food cycles, benthic life and population responses to various stressors and pollutants. Biomonitoring of ecosystem balance will be addressed.

Z532: Immunochemistry **٥٣٢ح: كمياء المناعة**

The course covers the chemical composition of antibodies and their classes, antibody domains and variability of antigen-antibody interaction sites. It describes the molecular basis of antibody variabilities and immune-related gene superfamilies. Factors affecting antigen-antibody interactions, nature of complement, integration between humoral and cellular immune responses and the role of cytokines, as well as immunological disorders will be mentioned. The course will detail the different immunological assays and their role in diagnosis.

Z533: Management of protected areas **٥٣٣ح: ادارة المحميات الطبيعية**

The course coversconcepts of protected areas, the role of protected areas in conserving global biodiversity and for global and regional sustainabledevelopment. Biodiversity concepts and the significance of “Hot Spots” will be mentioned. The course also describes categories and types of protected areas, and the different approaches towards management of protected areas. Distribution of protected areas in Egypt and the Egyptian law in the field will be illustrated. Important international organisations for the management of protected areas will be refered.

Z534: Histochemistry (1) **٥٣٤ح: كيمياء الأنسجة (١)**

The course introduces basics of routine histochemical staining techniques in different tissue compartments. It also covers techniques such electron microscopy, immunohistochemistry, and tissue enzyme histochemistry.

Z535: Treatment of ecological pollution **٥٣٥ح: معالجة التلوث البيئى**

The course covers different approaches for treatment of pollution and management of ecological crises in case of air, terrestrial and aquatic compartments. Also, it describes, treatment of industrial disposals including air-born particles, chemical and organic pollutants. Drinking water, waste water and solid waste treatments will be detailed. Bioremediation; and setting of emission and quality standards will be provided as well as awareness of modern environmental protection legislation and ethical considerations.

Z536: Assessment of freshwater animal diversity (1) **٥٣٦ح: تقدير التنوع الاحيائى فى المياه العذبة (١)**

This course covers description of aquatic animals’ diversity from different animal phyla including examples from, sponges, cnidarians, free living flatworms, rotifers, Nematoda, Gastrotricha, Polychaeta, oligochaetous, Mollusca, Arthropoda, fish, Amphibia, Reptilia, birds and mammals.

Z537: Environmental pollution **٥٣٧ح: التلوث البيئى**

The course covers the potential sources of pollution in different ecological compartments, including agricultural, industrial and anthropogenic activities. Also, it describes induced environmental problems (e.g. global warming and climate change), effect of pollution on biodiversity and speciation. Control measures will also be addressed. In addition, the course describes fundamentals of physical, biological

and chemical treatments of drinking water, sea wage and industrial effluents. Monitoring and quantification of pollutants in the environment will be discussed.

Z538: Food Poisoning (1) **٥٣٨ح: تسمم الأغذية (١)**

The course covers different examples of microorganisms that produce toxins in food. Toxicities in stored food, beverages and water will be addressed. Toxins detecting and quantification methods will be explained.

Z539: Basics of Environmental management & economics **٥٣٩ح: أسس الادارة البيئية والاقتصاد**

The course introduces students to the fields of environmental management. It defines basic concepts and main elements of environmental management, compare between different economic tools and models, with international standards, for environmental management, explain the role of cost-benefit analysis in environmental management and benefits of adopting environmental management system.

Z540: Studies in forensic medicine **٥٤٠ح: دراسات فى الطب الشرعى**

The course deals with variousmedico-legal aspects of diseases, essential forensic pathology, recognition and interpretation of wounds and other injuries. It explains the ways of medical and scientific investigation of fires and explosions, non-natural deaths and child abuse. Forensic toxicology, pathology and DNA fingerprinting will be illustrated.

Z541: Parasitology **٦٤١ح: الطفيليات (منقدم)**

The course covers the concepts of parasitism, fitness and host-parasite interaction. Also it describes the life cycles of internal protozoa, trematodes and nematodes in human and animals, rumen parasites in animals, blood parasites and tissue dwelling parasites. Life cycles of ectoparasites in animals phyla including mites, fleas, bed bugs, lice and other parasites will be detailed. Control and prevention methods will be addressed.

Z542: Blood physiology and blood diseases **٥٤٢ح: فسيولوجيا الدم وأمراض الدم**

The course describes the fundamentals of Hematopoiesis and hematopoietic tissues. Hemoglobin structure and functions.Leucocytes ontogeny and maturation.hematopoietic disorders (inherited and acquired). Hematopoiesis in health and disease.

ثانياً: الخطة الدراسية لبرامج الماجستير.

الكود		عدد المقررات	نوع المقرر	الساعات المعتمدة
ع	E			
٦٠٠ح	Z600	٥	إجباري	١٠
		٥	إختياري	١٠
		بحث الرسالة	إجباري	٢٢

العدد الكلي للساعات المعتمدة	٤٢

١. الساعات الإجبارية: يدرس الطالب ١٠ ساعات معتمدة موزعة على فصلين دراسيين بواقع ٦ساعات معتمدة في الفصل الدرلسي الأول و ٤ساعات معتمدة في الفصل الدرلسي الثاني.
٢. الساعات الاختيارية: يختار الطالب ١٠ ساعات معتمدة موزعة على فصلين دراسيين بواقع ٤ساعات معتمدة في الفصل الدرلسي الأول و ٦ساعات معتمدة في الفصل الدرلسي الثاني.
٣. بحث الرسالة مقرر إجباري (٦٠٠ح –Z600) بواقع ٢٢ ساعة معتمدة يبدأ بعد الانتهاء من إجراءات التسجيل لدرجة الماجستير.

١. المقررات الدراسية لدرجة الماجستير تخصص فسيولوجيا الحيوان.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٠٧ح	فسيولوجيا الدم وأمراض الدم	٢	-	٢	-	√
	٦٠٩ح	فسيولوجيا الغدد الصماء	٢	-	٢	-	√
	٦١١ح	علم الإنزيمات	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦٠٨ح	علم السموم	٢	-	٢	-	√
	٦١٠ح	كيمياء المناعة	٢	-	٢	-	√
	٦١٢ح	وراثة خلوية	٢	-	٢	-	√

٢. المقررات الدراسية لدرجة الماجستير تخصص علم بيولوجيا الخلية والأنسجة والوراثة والبيولوجيا الجزيئية.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦١٣ح	بيولوجيا الأمراض الوراثية	٢	-	٢	-	√
	٦١٥ح	أساسيات المجهر الإلكتروني	٢	-	٢	-	√
	٦١٧ح	كيمياء الأنسجة	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦١٠ح	كيمياء المناعة	٢	-	٢	-	√
	٦١٢ح	وراثة خلوية	٢	-	٢	-	√
	٦١٤ح	بيولوجيا الأورام	٢	-	٢	-	√

٣. المقررات الدراسية لدرجة الماجستير تخصص التشريح والأجنة.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦١٣ح	بيولوجيا الأمراض الوراثية	٢	-	٢	-	√
	٦١٥ح	أساسيات المجهر الإلكتروني	٢	-	٢	-	√
	٦١٩ح	تشريح مقارن فقاريات	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦١٦ح	تشريح مقارن لافقاريات	٢	-	٢	-	√
	٦١٨ح	علم التطور	٢	-	٢	-	√
	٦٢٠ح	علم الأجنة التجريبي	٢	-	٢	-	√

٤. المقررات الدراسية لدرجة الماجستير تخصص بيولوجيا الفقاريات والتطور.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦١٥ح	أساسيات المجهر الإلكتروني	٢	-	٢	-	√
	٦١٩ح	تشريح مقارن فقاريات	٢	-	٢	-	√
	٦٢١ح	حفريات فقارية	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦٢٢ح	التنوع البيئي	٢	-	٢	-	√
	٦٢٤ح	وراثة الجماعة و التطور	٢	-	٢	-	√
	٦٢٦ح	علم الوراثة الإنمائي	٢	-	٢	-	√

٥. المقررات الدراسية لدرجة الماجستير تخصص بيولوجيا اللافقاريات.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦١٥ح	أساسيات المجهر الإلكتروني	٢	-	٢	-	√
	٦١٧ح	كيمياء الأنسجة	٢	-	٢	-	√
	٦٢٣ح	تصنيف لافقاريات (مقدم)	٢	-	٢	-	√

	٦٢٥ح	حفريات لافقارية	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦١٦ح	تشريح مقارن لافقاريات	٢	-	٢	-	√
	٦٢٢ح	التنوع البيئي	٢	-	٢	-	√
	٦٢٨ح	بيئة مائية	٢	-	٢	-	√
	٦٣٠ح	فسيولوجيا اللافقاريات	٢	-	٢	-	√

٦. المقررات الدراسية لدرجة الماجستير تخصص علم البيئة.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٢٧ح	التلوث البيئي	٢	-	٢	-	√
	٦٢٩ح	التشوهات الجنينية	٢	-	٢	-	√
	٦٣١ح	تقدير التنوع الاحيائى في المياه العذبة	٢	-	٢	-	√
	٦٣٣ح	جغرافيا حوض نهر النيل	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦٢٢ح	التنوع البيئي	٢	-	٢	-	√
	٦٢٨ح	بيئة مائية	٢	-	٢	-	√
	٦٣٢ح	إحصاء حيوي تطبيقي	٢	-	٢	-	√
	٦٣٤ح	بيولوجيا البحيرات و البرك	٢	-	٢	-	√

٧. المقررات الدراسية لدرجة الماجستير تخصص علم المناعة والطفيليات.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٠٧ح	فسيولوجيا الدم وأمراض الدم	٢	-	٢	-	√
	٦١٥ح	أساسيات المجهر الإلكترونى	٢	-	٢	-	√
	٦١٧ح	كمياء الأنسجة	٢	-	٢	-	√
	٦٣٥ح	مناعة خلوية	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٣٢ح	إحصاء حيوي تطبيقي	٢	-	٢	-	√
	٦٣٦ح	الطفيليات (مقدم)	٢	-	٢	-	√
	٦٣٨ح	علم أمراض الأنسجة (باثولوجى)	٢	-	٢	-	√
	٦٤٠ح	حشرات طبية وبيطرية	٢	-	٢	-	√

٨. المقررات الدراسية لدرجة الماجستير تخصص إستزراع اللافقاريات.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٣١ح	تقدير التنوع الاحيائى فى المياه العذبة	٢	-	٢	-	√
	٦٣٧ح	بيولوجيا و استزراع جمبرى المياه العذبة	٢	-	٢	-	√
	٦٣٩ح	الاوليات و دورها فى العمليات البحرية	٢	-	٢	-	√
	٦٤١ح	الاستزراع البحري	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٣٠ح	فسيولوجي اللافقاريات	٢	-	٢	-	√
	٦٣٤ح	بيولوجيا البحيرات و البرك	٢	-	٢	-	√
	٦٤٢ح	امراض الجمبرى	٢	-	٢	-	√
	٦٤٤ح	انتاج واستخدام الغذاء الحى فى المزارع السمكية	٢	-	٢	-	√
	٦٤٦ح	أساسيات الاستزراع المائي	٢	-	٢	-	√

٩. المقررات الدراسية لدرجة الماجستير تخصص علم الحشرات.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦١٥ح	أساسيات المجهر الإلكترونى	٢	-	٢	-	√
	٦٤٣ح	المكافحة البيولوجية للحشرات	٢	-	٢	-	√
	٦٤٥ح	سلوك الحشرات	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦٠٨ح	علم السموم	٢	-	٢	-	√
	٦٢٢ح	التنوع البيئى	٢	-	٢	-	√
	٦٣٢ح	إحصاء حيوي تطبيقي	٢	-	٢	-	√
	٦٣٨ح	علم أمراض الأنسجة (باثولوجى)	٢	-	٢	-	√

١٠. المقررات الدراسية لدرجة الماجستير تخصص علم السموم.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-

	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٤٧ح	نباتات طبية و نباتات سامة	٢	-	٢	-	√
	٦٤٩ح	التسمم الميكروبى	٢	-	٢	-	√
	٦٥١ح	اساسيات الطب الشرعى	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٠٦ح	بيولوجيا إشعاعية	٢	-	٢	-	√
	٦٠٨ح	علم السموم	٢	-	٢	-	√
	٦٣٨ح	علم أمراض الأنسجة (باثولوجى)	٢	-	٢	-	√
	٦٤٠ح	حشرات طبية وبيطرية	٢	-	٢	-	√

١١. المقررات الدراسية لدرجة الماجستير تخصص بيولوجيا الأمراض المعدية.

الفصل الدراسي	كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
			نظري	عملي	معتمدة	إجباري	اختياري
الأول	٦٠١ح	أخلاقيات التجارب البيولوجية	٢	-	٢	√	-
	٦٠٣ح	بيولوجيا الخلية والإشارات الخلوية	٢	-	٢	√	-
	٦٠٥ح	تقنية حيوية	٢	-	٢	√	-
	٦٥٣ح	اساسيات الميكروبيولوجى	٢	-	٢	-	√
	٦٥٥ح	بكتريولوجى	٢	-	٢	-	√
	٦٥٧ح	الأمراض المشتركة	٢	-	٢	-	√
الثاني	٦٠٢ح	فحوص معملية	٢	-	٢	√	-
	٦٠٤ح	بيولوجيا جزيئية	٢	-	٢	√	-
	٦٣٦ح	الطفيليات (مقدم)	٢	-	٢	-	√
	٦٤٠ح	حشرات طبية وبيطرية	٢	-	٢	-	√
	٦٤٨ح	ميكولوجى	٢	-	٢	-	√
	٦٥٠ح	أساسيات الفيروسات	٢	-	٢	-	√
	٦٥٢ح	علم الفيروسات الطبية	٢	-	٢	-	√
	٦٥٤ح	الميكروبيولوجيا الطبية	٢	-	٢	-	√
	٦٥٦ح	مقدمة فى وبائيات انتشار الامراض	٢	-	٢	-	√

المحتوى العلمي للمقررات الدراسية لبرامج الماجستير

Z601: Ethics in biological experiments ٦٠١ح: أخلاقيات التجارب البيولوجية

The course covers fundamentals of experimentation ethics including approvals from corresponding authorities, following the rules of preserving of protected areas, natural fauna and endangered species. It also, describes the ethics in experimental animals during specimen(s) collection, injury/killing manipulations, pain relief during the experiments. Following the respected measures of biosafety and biosecurity during biological experiments. Also, close watching and recording actual measurements and observations, appropriate data analyses and avoidance of generalization. Criminalizing

experimentation on human beings.Having the required consents in case of patient samples or usage of individuals' data.Respecting the rules of privacy in all cases of biological studies.

Z602: Laboratory investigations **ح٦٠٢: فحوص معملية**

The course describes the safety measures in laboratories, biosafety and lab equipment. It covers samples preparation, stool and urine analyses. Also, blood analyses, serological and molecular analyses, using different molecular tools, in both health and disease conditions will be mentioned.

Z603: Cell biology and cell signaling **ح٦٠٣: بيولوجيا الخلية و الإشارات الخلوية**

The course examines the principals of cellular biology including membrane and organelle structure and function; bioenergetics; and cellular communication. The course also focuses on inter- and intracellular communication, from the generation of signaling molecules till the cellular responses. It covers the major signaling pathways. Explanations of cellular and molecular approaches will be mentioned.

Z604: Molecular Biology **ح٦٠٤: بيولوجيا جزيئية**

The course covers gene structure in prokaryotes and eukaryotes. Molecular mechanisms of DNA replication, repair, transcription, protein synthesis, gene regulation andchromatin structure and function in different organisms. RNA polymerase dynamics and regulation of gene expression will be discussed. Basic molecular techniques and experiments will be practiced.

Z605: Biotechnology **ح٦٠٥: تقنية حيوية**

The course focuses on handling and manipulating DNA in different organisms, engineered genes and transgenic organisms. It also covers the bioprocess and biosensors technologies, genetictechnology, hybridization based and immuno- based diagnostics, protein technology, bioremediation and quality standards.

Z606: Radiobiology **ح٦٠٦: بيولوجيا إشعاعية**

The course covers the biological responses of animals as well as human beings to ionizing and non-ionizing radiations. It describes different mechanisms and pathways involved in animal responses on cellular, subcellular and molecular levels. Also, role of radiation in induction of cancer, malformation and mutagenesis will be addressed. Relative risk and benefits of radiation usage are considered.

Z607: Blood physiology and blood diseases **ح٦٠٧: فسيولوجيا الدم وأمراض الدم**

The course describes the fundamentals of Hematopoiesis and hematopoietic tissues. Hemoglobin structure and functions.Leucocytes ontogeny and maturation.hematopoietic disorders (inherited and acquired). Hematopoiesis in health and disease.

Z608: Toxicology **ح٦٠٨: علم السموم**

The course covers the fundamental concepts on the toxicosis, toxicant classes including corrosives, metallic poisons, heavy metals, pesticides, insecticides, muolluscides, animal poisoning, volatile gases poisoning, mycotoxicosis, poisonous plants, irradiationand their occurrence and mechanism of action. Also, it covers factors affecting xenobiotics, mode of action and defense responses.

Z609: Endocrinology **٦٠٩ح: فسيولوجيا الغدد الصماء**

The course describes role and regulation of hormonal system associated with development, energy production and utilization, hemostasis, homeostasis, growth and reproduction. Also, it covers hormonal coordination, and endocrine related diseases

Z610: Immunochemistry **٦١٠ح: كيمياء المناعة**

The course covers the chemical composition of antibodies and their classes, antibody domains and variability of antigen-antibody interaction sites. It describes the molecular basis of antibody variabilities and immune-related gene superfamilies. Factors affecting antigen-antibody interactions, nature of complement, integration between humoral and cellular immune responses and the role of cytokines, as well as immunological disorders will be mentioned. The course will detail the different immunological assays and their role in diagnosis.

Z611: Enzymology **٦١١ح: علم الإنزيمات**

The course deals with classification and nomenclature of enzymes, structural organization of enzymes, isolation of enzymes, enzyme specificity, kinetics of enzymatic reactions, molecular mechanisms of enzymatic reactions, regulation of enzyme activity, multicomponent forms of Enzymes, immobilized enzymes and enzyme applications.

Z612: Cytogenetics **٦١٢ح: وراثة خلوية**

The course deals with cell cycles and cell cycle aberration. It describes chromosome banding, detection of chromosomal changes, variations in the number and structure of chromosomes in representative animal phyla. It illustrates chromosomal mapping, somatic cell hybridization, FISH technique and its applications, autosomal disorders, structure and number

Z613: Biology of Genetic Diseases **٦١٣ح: بيولوجيا الأمراض الوراثية**

The course covers the chromosomal analysis, chromosomal aberrations, molecular cytogenetics-mutations-mutagens and mutagenesis, autosomal recessive and x-linked disorders-twin studies-family clusters as well as marker association’s models (cancer- diabetes and infectious diseases).

Z614: Cancer Biology **٦١٤ح: بيولوجيا الأورام**

The course covers the fundamentals of conventional and molecular basis of cell cycle and hemostasis. Also, it describes the benign and malignant tumors as well as the characters of cancerous cells and

ways of metastasis will be discussed. Disturbances in cell signals and the significance of tumor markers will be addressed. Also, it illustrates the oncogenic, physical and chemical origin of cancer. Role of biological responses in induction of cancer including hepatocarcinoma..etc.

Z615: Fundamentals of electron microscopy **٦١٥ح: أساسيات المجهر الإلكتروني**

The course covers the different types of electron microscopes. Application of EM in life and basic sciences.Samples processing including fixation, sectioning, visilisation and imageing.Quality control of electron microscopy preparations and outputs.

Z616: Invertebrates comparative anatomy **٦١٦ح: تشريح مقارن لافقاريات**

The course covers the comparative anatomy of muscular, circulatory, integumentary, skeletal, digestive, respiratory and nervous, endocrine and urinogenital systems as well as receptor organs in different taxa of invertebrates.

Z617: Histochemistry **٦١٧ح: كيمياء الأنسجة**

The course introduces theory and practice of routine histochemical staining techniques, including microorganisms, tissue pigments and minerals, proteins and lipids in different tissue compartments. It also covers specialized techniques such electron microscopy, immunohistochemistry, and tissue enzyme histochemistry.

Z618: Evolution **٦١٨ح: علم التطور**

The course covers the different concepts and theories related to evolution. It describes the evidences from comparative anatomy, embryology, physiology and geological time chart. Also, it addresses the effects of selective pressure, mutations and adaptation on the evolution and geographical distribution.

Z619: Vertebrates comparative anatomy **٦١٩ح: تشريح مقارن فقاريات**

The course covers the comparative anatomy of muscular, circulatory, integumentary, skeletal, digestive, respiratory and nervous, endocrine and urinogenital systems as well as receptor organs in different taxa of vertebrates.

Z622: Experimental embryology **٦٢٠ح: علم الأجنة التجريبي**

The course describes the gametogenesis, induction of somatic cells to embryonic status, embryonic induction and control of differentiation. Also, it covers the molecular basis and biochemical changes of metamorphosis and organogenesis, control of embryonic development through stem cells. It illustrates the concepts of gene therapy in embryonic defects/malfornmation. Also, cell signaling and cell interactions through embryogenesis will be emphasized.

Z621: Vertebrate Paleontology **٦٢١ح: حفريات فقارية**

The course describes common definitions in vertebrate paleontology emphasizing vertebrates' subphyla and subclass, particularly Pisces and tetrapoda (Amphibia, Reptila, Aves and Mammalia). It also covers dinosaur paleobiology and the origin of birds. Major mammalian lineages and Primate origins. Importance of Fayoum province in Egypt as a famous locality for vertebrate fossils.Wadi EI-Hitan as a world heritage protectorate in Egypt. Also the study includes examples of each class in the laboratory.

Z622: Ecological Diversity **٦٢٢ح: التنوع البيئي**

The course covers distribution of different animal phyla in different ecosystems, factors affecting speciation and range shift. Sympatric vs allopatric and parapatric speciation.Ecosystem dynamics and equiliprium. Ecosystem management and anthropogenic threats.

Z623: Advanced invertebrates' taxonomy **٦٢٣ح: تصنيف لافقاريات (متقدم)**

This course describes the specific characteristics of the different invertebrate phyla including protista, porifera, cnidaria, platyhelminthes, nematoda, annelida, arthropoda, mollusca, echinodermata and their classes.

Z624: Population genetics and Evolution **٦٢٤ح: وراثة الجماعة والتطور**

The course explains the general concepts of quantitative genetics, gene pools, genetic polymorphisms, transposable elements and genetic equilibrium. Also, it covers distribution and change in frequency of alleles within populations along with the convenient biostatistics models. The main processes of evolution including natural selection, genetic drift, gene flow, mutation, and genetic recombination as well as related phenomena of adaptation, speciation, population subdivision, and population structure will be discussed.

Z625: Invertebrate paleontology **٦٢٥ح: حفريات لافقارية**

The course describes the invertebrate macro and micro paleontological course, includes; review on invertebrate macrofossil Phyla such as: porifera, cnidaria, bryozoa, brachiopoda, annelida, mollusca, echinodermata and arthropoda. Also it covers collection, preparation, preservation and identification of microfossils. An introductory survey of the major groups of microfossils, including calcareous, siliceous, phosphatic and organic-walled types. The skeletal anatomy, biology, mode of life, and geologic history of Foraminifera and some foraminifral genera and their classification will be detailed.

Z626: Population genetics and Evolution **٦٢٦ح: علم الوراثة الإنمائي**

The course describes the mechanisms that control embryonic and post-embryonic development, cell-cell signaling, transcriptional patterning, stem cells, cell differentiation, organogenesis, and morphogenesis. Morphogenesis gradients and gene regulatory mechanisms as well as programming and

reprogramming genes in development. The course emphasizes the degree of conservation of the genes controlling development throughout evolution within animal taxa.

Z627: Environmental pollution **ح٦٢٧: التلوث البيئي**

The course covers the general concepts of environmental pollution, potential sources of pollution in different ecological compartments, effect of pollution on biodiversity and control measures. Acid rains: causes, effects and counter measures. Ozon depletion and global worming: causes and remedies.

Z628: Aquatic ecology **ح٦٢٨: بيئة مائية**

The course covers the concepts of lakes and rivers as well as seas as ecosystems. The ecological zonation in both freshwater and marine habitats.Trophic dynamics in aquatic ecosystems and eutrophication. Effects of climate change on aquatic habitats. Lentic and lotic habitat, and their communities. Major differences between lotic and lentic systems. Benthic macroinvertebrates as indicator organisms, variation in diversity of benthic macroinvertebrate species as well asaquatic pollution and pollutants. Selected indicators of stream water quality, What is biomonitoring? biotic index, benthic macroinvertebrate biotic index.

Z629: Fetal malformation **ح٦٢٩: التشوهات الجنينية**

The course describes the concepts on the incidence, definitions and classification of brith defects, genetic cause of malformations, physical, chemical and biological agents as well as malformations of unkown cause.

Z630: Invertebrate physiology **ح٦٣٠: فسيولوجيا اللافقاريات**

The course describes the unique physiological processes of each invertebrates phylum including locomotion, feeding mechanisms and digestion, reproduction, osmoregulation, circulation, respiration, execration and sensation.

Z631: Assessment of freshwater animal diversity **ح٦٣١: تقدير التنوع الإحيائي في المياه العذبة**

Global diversity of aquatic macrophytes, sponges, cnidarians, free living flatworms (Platyhelminthes, ‘‘Turbellaria’’), rotifers, Nemertea, Nematoda, hairworms (Nematomorpha: Gordiaceae), Gastrotricha, bryozoans, Tardigrada, Polychaeta, oligochaetous, Hirudinea, Mollusca, Arthropoda, fish (Pisces), Amphibia, Reptilia, mammals, birds.

Z632: Biostatistics **ح٦٣٢: إحصاء حيوي تطبيقي**

The course covers the different types of experiments, methods of tabulation, manipulation and analysis of experimental data. Also, statistical concepts and models will be discussed. Application of statistical software including SPSS will be practiced.

Z633: Geography of Nile River basin **ز٦٣٣: جغرافيا حوض نهر النيل**

The course covers the concepts on the geography and climates of Nile River basin, plant and animal coverage. Also, the origin, development and passway of the Nile river. The impact of human activities on the water quantity and quality will be addressed. In addition, the effect of intervention of basin countries on the Egyptian water quota. The influence of political and ethnic conflicts on the water resources and the potential measaures to face the water crises in Egypt will be discussed.

Z634: Geography of Nile River basin **ز٦٣٤: بيولوجيا البحيرات والبرك**

The abiotic frame and adaptations to cope with abiotic constraints. The organisms: the actors within the abiotic frame. Predation and herbivory, Parasitism, Symbiosis, Practical experiments and observations, Food web interactions in freshwater ecosystems. Biodiversity and environmental threats, biodiversity in lakes and ponds,paleolimnology as a tool to understand history, eutrophication, Acidification, contamination, global climate change

Z635: Cellular immunology **ز٦٣٥: مناعة خلوية**

The course illustrates the ontogeny of immune cells, cell communication, cytokines, complement system, development, structure and function of cell receptors of immune cells. Histocompatibility and histocompatibility receptors will be mentioned. Also, it covers cell mediated immunity and hypersensitivity reactions.

Z636: Advanced parasitology **ز٦٣٦: الطفيليات (متقدم)**

The course covers the concepts of parasitism, fitness and host-parasite interaction. Also it describes the life cycles of internal protozoa, trematodes and nematodes in human and animals, rumen parasites in animals, blood parasites and tissue dwelling parasites. Life cycles of ectoparasites in animals phyla including mites, fleas, bed bugs, lice and other parasites will be detailed. Control and prevention methods will be addressed.

Z637: Biology and farming of freshwater prawns **ز٦٣٧: بيولوجيا واستزراع جمبري المياه العذبة**

History and global status of freshwater prawn farming.Introduction to the origins of modern freshwater prawn culture.Global production status, summary of opportunities and constraints. Biology, broodstock management, hatchery systems and management, larval feeds and feeding, nursery systems and management, grow-out systems, site selection and pond construction, monoculture, culture in temperate zones, polyculture and integrated culture, nutrition, feeds and feeding, water quality and soil management, health management, genetics, the biology and management of size variation. Commercial freshwater prawn farming and enhancement around the world, post-harvest handling and processing, marketing and preparation for consumption, economics and business management. Sustainability of freshwater prawn culture.

Z638: Pathology — ٦٣٨ح: علم أمراض الأنسجة (باثولوجي)

The course covers general concepts on cell injury, disturbance in cell metabolism and growth as well as hemodynamics. Also, it describes the fundamentals of apoptosis, inflammation, necrosis, cirrhosis fibrosis and gangrene. Differentiation of benign tumors and neoplasia as well as different types of tissue reactions willdisscused. Also, immunopathology will be addressed.

Z639: Protozoa and their role in marine processes — ٦٣٩ح: الأوليات ودورها فى العمليات البحرية

An introduction to a taxonomic review of heterotrophic protists important in marine ecology. Methods for the study of marine microzooplankton Session, Quantitative sampling of field populations of protozooplankton. Protists and pollution - with an emphasis on planktonic ciliates and heavy metals.Endosymbiosis in the protozoa.Mixotrophy in marine planktonic ciliates: physiological and ecological aspects of plastid retention by oligotrichs. Brief perspective on the autecology of marine protozoa.Community grazing in heterotrophic marine protista.trophic behavior and related community feeding activities of heterotrophic marine protists. Protozoan global production of heterotrophic ciliates.

Z640: Medical and veterinary entomology — ٦٤٠ح: حشرات طبية وبيطرية

The course includes morphology, life cycles, systematics of medically and veterinary important insects including members of order diptera such as members ofPhlebotominae, Anophelen and Culicine. Also, the course covers their feeding habits and living habitat, effect of climatic condition on reproduction and distribution. Concepts of myiasis including introduction, morphology, life cycles, classification and control measures of flies involved in myiasis will be mentioned.

Z641: Mariculture — ٦٤١ح: الاستزراع البحري

Introduction to and purposes of mariculture- site selection- water quality and sources- Cage culture- Cage design: Floating flexible, floating rigid, semi-submersible and submersible- fish species suitable for aquaculture- induction of spawning and larval keeping.

Z642: Shrimp Diseases — ٦٤٢ح: أمراض الجمبري

Shrimp Species and Anatomy, Obvious Manifestations of Shrimp Disease: (Damaged Shells, Inflammation and Melanization, Emaciation and Nutritional Deficiency, Muscle Necrosis, Tumors and Other Tissue Problems, Surface Fouling, Cramped Shrimp, Unusual Behavior, Developmental Problems, Growth Problems, Color Anomalies, Microbes, Viruses, Bacteria and Rickettsia, Fungus, Protozoa, Haplospora, Gregarina, Body Invaders, Surface Infestations, Worms, Trematodes, Cestodes, Nematodes, etc..).

Z643: Biological Control of Insects — ٦٤٣ح: المكافحة البيولوجية للحشرات

The course covers fundamentals of biological control including biology of predators, parasitoids and pathogenic agents, interaction between herbivores and natural enemies, biotechnology in biological control, biological control in pest management.

Z644: Production and use of live food for aquaculture **٦٤٤ح: إنتاج واستخدام الغذاء الحي في المزارع السمكية**

Major classes and genera of cultured algal species, algal production, growth dynamics, isolating/obtaining and maintaining of cultures, sources of contamination and water treatment, algal culture techniques, algal production in outdoor ponds, culture of sessile micro-algae, quantifying algal biomass, harvesting and preserving micro-algae, algal production cost, use of micro-algae in aquaculture, replacement diets for live algae, preserved algae, rotifers, artemia, cladocerans, nematodes and trochophora larvae morphology, biology and life history, strain differences, general culture conditions, marine rotifers, freshwater rotifers, culture procedures, harvesting/concentration of rotifers, nutritional values of the cultured rotifers. Production and use of resting eggs.

Z645: Insect behavior **٦٤٥ح: سلوك الحشرات**

The course describes the mechanisms underlying the behavior of insects; emphasis on neuroelhological and evolutionary bases of insect orientation, mating and reproduction, feeding, oviposition, defense, learning, and sociality.

Z646: Principles of Aquaculture **٦٤٦ح: أساسيات الاستزراع المائي**

The course covers an introduction to the types of aquaculture systems: Open, Semi-closed, closed systems. Common culture method for each fish category, culture types, hanging culture, bottom culture, semi-enclosed, and closed systems. Recirculating, raceways, and inland ponds- fish transport-fish care.

Z647: Medicinal and poisonous plants **٦٤٧ح: نباتات طبية ونباتات سامة**

The course describes the general concepts on medicinal and toxic plants with reference to Egyptian flora. Systematic of medicinal and toxic plants, toxic materials in each plant, distribution of toxic/medicinal materials in different parts of the plant, extraction methods, and different assays of toxicity in the plants/plant extracts will be detailed.

Z648: Mycology **٦٤٨ح: ميكولوجي**

The course covers different methods of disinfection, sterilization, biosafety, culturing and culture media of fungi and yeasts. Basic structure, morphology, metabolism, and taxonomy of fungi and yeasts. Serological, biochemical and molecular identification and typing will be illustrated. Role of immune responses and hypersensitivity in mycotic infections will be addressed.

Z649: Microbial poisoning **ز٦٤٩: التسمم الميكروبي**

The course describes toxin producing microorganisms in food and food products. Risk of toxicosis in processed food, animal food, beverage, drinking water, and surface water. Description of standard methods of detection and quantification of such microorganisms and their toxins.

Z650: Fundamentals of virology **ز٦٥٠: أساسيات الفيروسات**

The course covers structure and classification and phylogeny of RNA and DNA viruses as well as viroids and prions. It also describes host cell attachment and invasion, uncoating, replication strategies, assembly, incubation, transmission andviral evolution. Pathogenesis of the viruses will be addressed. Also, the common techniques of virus isolation, culturing as well as sero-and molecular identification will be detailed.

Z651: Fundamentals of forensic medicine **ز٦٥١: أساسيات الطب الشرعي**

The course describes identification of death, wounds, thermal injuries, asphyxia, abortion, infanticides, medical rules and ethics. Basic concepts on toxicosis symptoms, detection and quantification of toxicants will be addressed. Fundamentals of crime scene investigations including fingerprints, biological as well as molecular evidences.

Z652: Medical virology **ز٦٥٢: علم الفيروسات الطبية**

The course covers principles of animal and human molecular virology. Topics include replication, expression, pathogenesis, methods of diagnosis and detection, current uses of viruses in gene therapy and vaccine applications, viruses and cancer and other diseases, persistent infections, and emerging viruses. Comprehensive examples of different viral taxa.

Z653: Essentials in Microbiology **ز٦٥٣: أساسيات الميكروبيولوجي**

The course deals with basic structure and taxonomy of bacteria, fungi and viruses. It also covers disinfection and antisepsis procedures, microbial growth and death measurements, microbiological sampling and analysis of different environments, antimicrobial analysis. Also, it illustrates different approaches of selected pathogenic microorganisms.

Z654: Medical microbiology **ز٦٥٤: الميكروبيولوجيا الطبية**

The course covers basic concepts of medical microbiology, explaining the fundamental information about the pathogenic microorganisms, studying the types of pathogenic microbes and the host infection, summarizing the essential conceptions of mechanism of action between microorganism and the host. It also discusses the most recent techniques in the field of microbial biotechnology.

Z655: Bacteriology **ز٦٥٥: بكتريولوجي**

The course covers different methods of disinfection, sterilization, biosafety, culturing and culture media. Basic structure and taxonomy of bacteria. Serological, biochemical and molecular identification and bacterial typing. Antigenic structure and virulence factors in bacteria as well as development of antimicrobial resistance and resistance genes will be discussed.

Z656: Introduction to epidemiology **٦٥٦ح: مقدمة فى وبائيات انتشار الامراض**

The course provides introduction to epidemiology, covers the principles and methods of epidemiologic investigation including describing the patterns of illness in populations and research designs for investigating the etiology of disease, introduces quantitative measures to determine risk, association and procedures for standardization of rates.

Z657: Zoonotic diseases **٦٥٧ح: الأمراض المشتركة**

The course covers the general concepts of zoonosis, selected topics of zoonotic parasites, bacteria, fungi, viruses and prions. It describes routes of transmission, pathogenesis of the infection, control and prevention measures. Also, surveillance programs will be addressed.

ثالثاً: الخطة الدراسية لبرامج دكتوراه الفلسفة.

الكود		عدد المقررات	نوع المقرر	الساعات المعتمدة
ع	E			
٧٠٠ح	Z700	٣	إجباري	٦
		٢	اختياري	٤
		بحث الرسالة	إجباري	٤٨
العدد الكلي للساعات المعتمدة				٥٨

١. الساعات الإجبارية: يدرس الطالب ٦ساعات معتمدة.
٢. الساعات الاختيارية: يختار الطالب ٤ساعة معتمدة.
٣. بحث الرسالة مقرر إجباري (٧٠٠ح –Z700) بواقع ٤٨ ساعة معتمدة يبدأ بعد الانتهاء من إجراءات التسجيل لدرجة الدكتوراه.

١. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص فسيولوجيا الحيوان.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧٠٢ح	علم وظائف الأعضاء الجزيئى	٢	-	٢	√	-
٧٠٣ح	إختلالات وظيفية	٢	-	٢	√	-
٧٠٤ح	فسيولوجيا اللافقاريات (٢)	٢	-	٢	-	√
٧٠٥ح	فسيولوجيا الغدد الصماء	٢	-	٢	-	√
٧٠٦ح	مناعة خلوية وجزيئية	٢	-	٢	-	√

٧٠٧ح	فسيولوجيا الفقاريات المقارن	٢	-	٢	-	√
٧٠٨ح	علم الجينوم والبروتيوم	٢	-	٢	-	√
٧٠٩ح	فسيولوجيا التنفس	٢	-	٢	-	√
٧١٠ح	بيولوجيا الأورام (٢)	٢	-	٢	-	√

٢. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص علم بيولوجيا الخلية والأنسجة والوراثة والبيولوجيا الجزيئية.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧٠٨ح	علم الجينوم و البروتيوم	٢	-	٢	√	-
٧١١ح	بيولوجيا جزيئية تطبيقية	٢	-	٢	√	-
٧١٠ح	بيولوجيا الأورام (٢)	٢	-	٢	-	√
٧١٢ح	هندسة وراثية	٢	-	٢	-	√
٧١٣ح	وراثة فوقية	٢	-	٢	-	√
٧١٤ح	بيولوجيا الخلايا الجذعية	٢	-	٢	-	√
٧١٥ح	وراثة الجماعة والتطور	٢	-	٢	-	√
٧١٦ح	التشخيص والعلاج الجزيئى	٢	-	٢	-	√

٣. المتطلبات الدراسية لبرنامج دكتوراة الفلسفة تخصص التشريح والأجنة.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧٠٨ح	علم الجينوم و البروتيوم	٢	-	٢	√	-
٧١٤ح	بيولوجيا الخلايا الجذعية	٢	-	٢	√	-
٧١٠ح	بيولوجيا الأورام (٢)	٢	-	٢	-	√
٧١٢ح	هندسة وراثية	٢	-	٢	-	√
٧١٧ح	علم الأجنة التجريبى و التشوهات الجنينية	٢	-	٢	-	√
٧١٨ح	بيولوجيا الأمراض الوراثية	٢	-	٢	-	√

٤. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص بيولوجيا الفقاريات والتطور.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧١٩ح	حفريات فقارية (٢)	٢	-	٢	√	-
٧٢٠ح	التنوع البيولوجى للفقاريات	٢	-	٢	√	-
٧٠٨ح	علم الجينوم و البروتيوم	٢	-	٢	-	√
٧١٣ح	وراثة فوقية	٢	-	٢	-	√
٧٢١ح	بيولوجيا الفقاريات المائية	٢	-	٢	-	√

٥. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص بيولوجيا اللافقاريات.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية وفيلوجنى	٢	-	٢	√	-
٧٢٢ح	حفريات لافقارية (٢)	٢	-	٢	√	-
٧٢٣ح	لافقاريات اقتصادية	٢	-	٢	√	-
٧٠٤ح	فسيولوجيا اللافقاريات (٢)	٢	-	٢	-	√
٧٠٨ح	علم الجينوم والبروتيوم	٢	-	٢	-	√
٧١٠ح	بيولوجيا الأورام (٢)	٢	-	٢	-	√

٦. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص علم البيئة.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية وفيلوجنى	٢	-	٢	√	-
٧٢٤ح	معالجة التلوث البيئى	٢	-	٢	√	-
٧٢٦ح	التغيرات المناخية	٢	-	٢	√	-
٧٠٨ح	علم الجينوم والبروتيوم	٢	-	٢	-	√
٧٢٥ح	التلوث الصناعى وادارة المعالجة	٢	-	٢	-	√
٧٢٧ح	الجغرافيا المناخية والسياسية وتوزيع المياه	٢	-	٢	-	√
٧٢٨ح	ادارة المحميات الطبيعية	٢	-	٢	-	√

٧. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص علم المناعة والطفيليات.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧٠٦ح	مناعة خلوية و جزيئية	٢	-	٢	√	-
٧٣٠ح	الأمراض الطفيلية المشتركة	٢	-	٢	√	-
٧٠٢ح	علم وظائف الأعضاء الجزيئى	٢	-	٢	-	√
٧٠٨ح	علم الجينوم و البروتيوم	٢	-	٢	-	√
٧٢٩ح	مناعة اللافقاريات	٢	-	٢	-	√

٨. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص علم الحشرات.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية وفيلوجنى	٢	-	٢	√	-
٧٣١ح	مبيدات الحشرات والمكافحة المتكاملة	٢	-	٢	√	-
٧٣٢ح	حشرات صحراوية وتكيف	٢	-	٢	√	-
٧٠٤ح	فسيولوجيا اللافقاريات (٢)	٢	-	٢	-	√

٧٠٨ح	علم الجينوم والبروتيوم	٢	-	٢	-	√
٧٢٦ح	التغيرات المناخية	٢	-	٢	-	√
٧٣٠ح	الأمراض الطفيلية المشتركة	٢	-	٢	-	√
٧٣٣ح	الحشرات الاجتماعية	٢	-	٢	-	√

٩. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص علم السموم.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية و فيلوجنى	٢	-	٢	√	-
٧٣٤ح	فسيولوجيا التسمم	٢	-	٢	√	-
٧٣٥ح	التسمم بالأدوية	٢	-	٢	√	-
٧٠٨ح	علم الجينوم و البروتيوم	٢	-	٢	-	√
٧٣٦ح	تسمم الأغذية	٢	-	٢	-	√
٧٣٧ح	دراسات مقدمة فى الطب الشرعى	٢	-	٢	-	√

١٠. المقررات الدراسية لدرجة دكتوراه الفلسفة تخصص بيولوجيا الأمراض المعدية.

كود المقرر	اسم المقرر	عدد الساعات			حالة المقرر	
		نظري	عملي	معتمدة	إجباري	اختياري
٧٠١ح	معلوماتية حيوية وفيلوجنى	٢	-	٢	√	-
٧٣٨ح	ميكروبيولوجى متقدم	٢	-	٢	√	-
٧٤٠ح	الأمراض العابرة للحدود	٢	-	٢	√	-
٧٠٨ح	علم الجينوم والبروتيوم	٢	-	٢	-	√
٧٣٩ح	علم الفيروسات متقدم	٢	-	٢	-	√
٧٤١ح	وبائيات إنتشار الأمراض متقدم	٢	-	٢	-	√
٧٤٢ح	ميكروبيولوجيا جزيئية وتطبيقية	٢	-	٢	-	√
٧٤٣ح	امراض المنطق الحارة	٢	-	٢	-	√

المحتوى العلمي للمقررات الدراسية لبرامج دكتوراه الفلسفة

٧٠١ح: معلوماتية حيوية وفيلوجنى — Z701: Bioinformatics and phylogeny

The course deals with usage of computer in molecular modeling and analysis, gene and protein sequences, alignment and protein structure prediction. Also, it describes basics of phylogeny and evolution relationships based on different criteria and application of different software.

٧٠٢ح: علم وظائف الأعضاء الجزيئى — Z702: Molecular physiology

The course deals with the molecular characteristics of different types of muscle function, molecular mechanisms of conduction, action potential, and neurotransmission at synapses and neurotransmitters. It covers molecular basis of hormonal regulation and transmembrane transportation and signal transduction.

Z703: Physiological disorders ٧٠٣ح: إختلالات وظيفية

The course covers physiological hemostasis and disorders. It emphasize disorder patterns of diabetes, coronary heart disease, stroke, hypertension, Parkinson's disease, Alzheimer's disease, motor neuron disease, multiple sclerosis, rheumatoid arthritis, osteoporosis, inflammatory bowel diseases. It describes disorders related to nutrients deficiency. Molecular basis of above mentioned disorders will be addressed.

Z704: Invertebrate physiology (2) ٧٠٤ح: فسيولوجيا اللافقاريات (٢)

The course describes the unique physiological processes of each invertebrates' phylum including locomotion, feeding mechanisms and digestion, reproduction, osmoregulation, circulation, respiration, execration and sensation.

Z705: Endocrinology ٧٠٥ح: فسيولوجيا الغدد الصماء

The course describes role and regulation of hormonal system associated with development, energy production and utilization, haemostasis, homeostasis, growth and reproduction. Also, it covers hormonal coordination, and endocrine related diseases

Z706: Cellular and molecular immunology ٧٠٦ح: مناعة خلوية و جزيئية

The course covers the general concepts on cell mediated immunity, different types of hypersensitivity reactions, role of T cell subsets, cell receptors, histocompatibility molecules, as well as activation and regulation of immune-related gene superfamilies in case of health, disease and infection. Also, cellular and molecular basis of cell mediated abnormalities will be discussed.

Z707: Comparative animal physiology ٧٠٧ح: فسيولوجيا الفقاريات المقارن

The course covers comparative aspects of vertebrate aerobic and anaerobic pathways, as well as design of respiratory structures, respiratory pigments and gas exchange. It describes acid-base balance, osmoregulation, energy production and utilization, thermoregulation as well as physiology of locomotion, sensation and execration.

Z708: Genomics and proteomics ٧٠٨ح: علم الجينوم و البروتيوم

The course deals with genomics classification, structure and organization of prokaryotic genomes, transcriptional regulators of bacterial genes, tansposable genetic elements in bacterial genomes, bacterial operons, islands of pathogenicity and resistance, structure and organization of eukaryotic genomes, repetitive and transposable elements, telomeric and subtelomeric regions, as well as evolution and structure of mitochondrial genomes. Also, the structure and function of proteom in different organisms using classical and advanced techniques in molecular genetics. Also, application of proteome information in detection of diseases will be addressed

Z709: Physiology of Respiration **٧٠٩ح: فسيولوجيا التنفس**

The course focuses on human respiratory physiology including hemodynamics structure of the respiratory system, pulmonary and alveolar ventilation, pulmonary circulation and gas exchange, oxygen and carbon dioxide transport, respiratory control, acid base balances and nonrespiratory lung functions.

Z710: Cancer biology (2) **٧١٠ح: بيولوجيا الأورام (٢)**

This course covers description of different types, nomenclature and classification of tumors, etiology, general characteristics and histological assessment of neoplasia. Tumour differentiation, malignant neoplasia-dysplasia and situ neoplasia- staging of malignant tumors, tumors of epithelial origin including squamous cell carcinoma, tumors of connective tissue origin including lymphoma, neuroendocrine tumors- sarcomas- neuroplastoma.

Z711: Applied molecular biology **٧١١ح: بيولوجيا جزيئية تطبيقية**

The course covers the different types of molecular vectors, transformation, transfection and detection of gene products. Also, it covers concepts of agarose gel electrophoresis, nucleic acid purification and quantification, DNA restriction digestion and analysis, Southern hybridization, library constructio, and basics of computer-based DNA sequence analysis.

Z712: Genetic engineering **٧١٢ح: هندسة وراثية**

The course covers fundamental concepts of gene technology, common biotechnology techniques, transgenic animal production, recombinant microorganisms and protein production. Also, biosafety of genetically modified organisms will be discussed.

Z713: Epigenetics **٧١٣ح: وراثة فوقية**

The course describes the structure and functions of the nuclear proteins as well as the dynamic alterations in the transcriptional potential of the cell. It covers the changes of non-nucleotide elements including DNA methylation and histone modifications that affect gene expression and phenotype production. Also, it details epistatic relationships, epistasis in health and disease and the path of evolutionary changes.

Z714: Stem cell biology **٧١٤ح: بيولوجيا الخلايا الجذعية**

The course covers a brief history of the field, cell potency and different cell linages. It also describes research on animal models, tissue engineering, and the political and ethical issues related to stem cell technology.

Z715: Population genetics and Evolution **٧١٥ح: وراثة الجماعة و التطور**

The course explains the general concepts of quantitative genetics, gene pools, genetic polymorphisms, transposable elements and genetic equilibrium. Also, it covers distribution and change in frequency of alleles within populations along with the convienient biostatistics models. The main processes of evolution including natural selection, genetic drift, gene flow, mutation, and genetic recombination as well as the related phenomena of adaptation, speciation, population subdivision, and population structure will be discussed.

Z716: Molecular diagnostics and therapeutics **٧١٦ح: التشخيص والعلاج الجزيئى**

The course provides an overview of the concepts, strategies and different methods used for molecular and gene therapy according to the nature of the disease, chromosome abnormalities, mitochondrial disorders and single gene disorders.Also, treating some genetic diseases and resistant malignancies according to the causative genetic defectand production of molecular therapeutics and vaccines.

Z717: Experimental embryology and embryonic malformations **٧١٧ح: علم الأجنة التجريبى و التشوهات الجنينية**

The course describes the gametogenesis, embryonic induction and control of differentiation. Also, it covers the molecular basis ofmetamorphosis and organogenesis. The course provides the general concepts of definitions and classification of birth defects, as well as the physical, chemical, biological and environmental causes of malformations.

Z718: Biology of Genetic Diseases **٧١٨ح: بيولوجيا الأمراض الوراثية**

The course covers the chromosomal analysis, chromosomal aberrations, molecular cytogenetics-mutations-mutagens and mutagenesis, autosomal recessive and x-linked disorders-twin studies-family clusters as well as marker associations models (cancer- diabetes and infectious diseases)

Z719: Vertebrate paleontology (2) **٧١٩ح: حفريات فقارية (2)**

The course describes the following topics: Ordovician vertebrates including the age of spinal life-forms (the jawless fish -fauna and flora - the ordovician ice age); Carboniferous amphibians including the age of forest denizens; Permian reptiles including the age of desert inhabitants (the reptilian era - mammal-like reptiles)-mass extinction; Triassic dinosaurs including the age of big beasts; Jurassic birds including the age of flying creatures (the early birds - the pterosaurs - the giant dinosaurs); Tertiary mammals including the age of advanced species (the mammalian era -marine mammals) andquaternary glaciation including the age of modern life (the human era - the pleistocene ice ages -the holocene interglacial - megahervibore extinction.

Z720: Vertebrates' Biodiversity **٧٢٠ح: التنوع البيولوجى للفقاريات**

The course provides an overview of the origin of species, distribution of vertebrate phyla in tree of life, taxonomy, measurements of diversity, biodiversity indicators, evolution and speciation, convergence, divergence and phylogenetic in environmental contexts. Also, the course describes the sixth extinction event, human impact on biodiversity.

Z721: Biology of aquatic vertebrates **ز٧٢١: بيولوجيا الفقاريات المائية**

This course provides an understanding of the evolution, physiology, locomotion and migratory patterns and adaptations of vertebrates to life in the aquaticenvironment including hagfishes, lampreys, cartilaginous and bony fishes, sea turtles, crocodilians, marine lizards and snakes, birds, and mammals. Also, adaptive features of marine reptiles, birds and mammals as well as conservation of marine will be mentioned.

Z722: Invertebrate paleontology (2) **ز٧٢٢: حفريات لا فقارية (2)**

The course covers the following topics: Archean algae including the age of early life (the age of algae - the protozoans –photosynthesis); Proterozoic metazoans including the age of complex organisms (the age of worms - the ediacaran fauna); Cambrian invertebrates including the age of shelly faunas (the cambrian explosion -the age of trilobites); Cretaceous corals including the age of tropical biota (the ammonite era - the angiosperms). Also, it describes an introduction to mineral - walled microfossils: Phosphatic (conodonts), siliceous (Radiolaria and marine Diatoms), calcareous (ostracods& calcareous nannofossils). Applications of micropaleontology to biostratigraphy, paleoecology, paleoceanography, paleoclimatology and environmental geology.Major mass extinction events. Practical studies of the different fossil groups under the microscope in terms of morphology and structure will be addressed.

Z723: Economic Invertebrates **ز٧٢٣: لافقاريات اقتصادية**

The course includes the following topics: Vermiculture and composting, types of earthworm, rearing technology, management, economic importance, composting. Apiculture, species of honey bees, types of bee hives, care and management, honey extraction , Nutritive and medicinal value of honey. Sericulture, feeding habits of larvae, life cycle of silkworm (*Bombyxmori*), economic importance of silkworm and silk. Aquaculture, construction of pond, management of a pond, induced breeding, prawn culture and diseases.

Z724: Treatment of ecological pollution **ز٧٢٤: معالجة التلوث البيئى**

The course covers different approaches for treatment of pollution and management of ecological crises in case of air, terrestrial and aquatic compartments. Also, it describes, treatment of industrial disposals including air-born particles, chemical and organic pollutants. Drinking water, waste water and solid waste treatments will be detailed. Bioremediation; and setting of emission and quality standards will be provided as well as awareness of modern environmental protection legislation and ethical considerations.

Z725: Industrial pollution and management process **ز٧٢٥: التلوث الصناعى و ادارة المعالجة**

The course explains characteristics and composition of industrial wastes in selected sectors including sugar, distillery, tannery, dairy, textile and chemical production. Impact on the air, surface water, streams and ground water as well as public health will be described. The course also covers the sampling and methods of analysis of industrial wastes, and the measures for treatment including in-

plant conservation, material, reclamation, recycling and disposal. Common treatment technologies including physical, chemical and biological processes will be detailed in selected cases.

Z726: Climatic changes **ز٧٢٦: التغيرات المناخية**

The course covers the general concepts of the climatic changes, factors contributing to these changes, effect of climatic changes on sea levels, El Neneo and La Nenea phenomena, effect of climatic changes on rainfall and dryness in Nile river basin and in Arab countries. International regulations to control of the climatic changes will be described.

Z727: Climatic and political geography and water distribution **ز٧٢٧: الجغرافيا المناخية و السياسية و توزيع المياه**

The course explains the general concepts of geo-climatic domains, aquatic and terrestrial domains as well as rainy and arid domains in Africa and Arab countries. Also, the course covers the general concepts on geo-political boundaries and domains, political sovereignty and national security, water domains and national security, water resources and geo-political boundaries in Arab countries. It describes the conflictions due to water resources and potential water wars. International law on regulation of water usage and cross boundaries' rivers will be mentioned.

Z728: Management of protected areas **ز٧٢٨: إدارة المحميات الطبيعية**

The course covers concepts of protected areas, the role of protected areas in conserving global biodiversity and for global and regional sustainable development. Biodiversity concepts and the significance of "Hot Spots" will be mentioned. The course also describes categories and types of protected areas, and the different approaches towards management of protected areas. Distribution of protected areas in Egypt and the Egyptian law in the field will be illustrated. Important international organizations for the management of protected areas will be referred.

Z729: Invertebrates immunology **ز٧٢٩: مناعة اللافقاريات**

The course covers the functional organization of the immune system of invertebrates, molecules involved inimmune reactions, and regulation of the immune processes. The course will detail the different immunological assays and their role in diagnosis.

Z730: Zoonotic parasites **ز٧٣٠: الأمراض الطفيلية المشتركة**

The course covers the general concepts on zoonosis, zoonotic parasites in farm animals, pet animals and birds. Also, it describes transmission routs, host-parasite interaction, diagnosis, control and prevention measures.

Z731: Integrated pest control **ز٧٣١: مبيدات الحشرات والمكافحة المتكاملة**

The course covers concepts of harmful and beneficial insects, population monitoring, as well as preventive, suppressive, regulatory control of pests. Biological control, biology of predators,

parasitoids and pathogenic agents, interaction between herbivores and natural enemies, biotechnology in biological control, biological control in pest management will be discussed. The course explains the chemical structure of the different groups of insecticides, methods of application and the mode of action. Also, efficiency and limits of insecticides and emergence of resistance will be mentioned.

Z732: Desert insects and adaptation **٧٣٢ح: حشرات صحراوية وتكيف**

Insects have adapted to the stresses of the desert (to survive the heat and lack of water). Desert adaptations can be manifested in behavior, size, shape, or physiology.

Z733: Socialinsects **٧٣٣ح: الحشرات الاجتماعية**

The course covers the diversity of social insects with an eye toward the rules they use to produce the most successful societies on Earth with emphasis on the highly social insects such as bees and wasps.

Z734: Physiology of toxcicity **٧٣٤ح: فسيولوجيا التسمم**

The course covers the different classes of poisons including heavy metals, pesticides, insecticides, herbicides and biological toxins in terms of potential exposure routs, mechanism of action, detection and quantitation. Symptoms of toxcicity in different animals. Physiological responses to toxicosis, cell injury, genetic damage as well as differential gene expression will be detailed. Also, measures for intervention will be described.

Z735: Drug Poisoning **٧٣٥ح: التسمم بالأدوية**

The course covers the general concepts of therapeutic, sub-toxic and toxic doses, drugs interaction, potential exposure routes, accumulative effects, sedative and narcotic drugs, symptoms of toxicity and measures of intervention.

Z736: Food Poisoning **٧٣٦ح: تسمم الأغذية**

The course describes toxin producing microorganisms in food and food products as well as food and milk spoilage. Risk of toxicosis in stored food, animal food, beverage, drinking and bottled water. Description of standard methods of detecting and quantification of such microorganisms and their toxins.Toxicosis due to mal-processing, canning, packing and marketing.

Z737: Advanced forensic medicine Studes **٧٣٧ح: دراسات متقدمة فى الطب الشرعى**

Medico-legal aspects of diseases, essential forensic pathology, recognition and interpretation of wounds and other injuries will be studied. Also, it describes medical and scientific investigation of fires, explosions and similar causes of non-natural deaths, child deaths and child abuse; investigation of sexual offences, principles of law of evidence, fatal accident inquiries. Principles of forensic toxicology, forensic DNA, odontology, pathology; anthropology (identification and investigation of

human remains), forensic entomology (insect evidence), fingerprint, crime scene and blood spatter analysis will be described. Moreover, human rights and torture investigation as well as investigation of mass disasters will be discussed.

Z738: Advanced Microbiology **٧٣٨ح: ميكروبيولوجى متقدم**

The course covers important bacterial and fungal pathogens in terms of epidemiological aspects, pathogenesis, molecular mechanisms of emergence of drug resistance and drug resistance genes. Description of microbial genetic processes including mutation, repair, genetic exchange, recombination, and gene expression will be illustrated. Toxin producing bacteria and fungi will be emphasized along with the toxin coding genes.

Z739: Advanced Virology **٧٣٩ح: علم الفيروسات متقدم**

The course describes the viral-host interaction, pathogenesis and the mechanism of action of typical antiviral drugs. It covers gene expression and regulation of viruses as well as viral genomics and proteomics. Also, molecular aspects including mutation, repair, genetic exchange, recombination and/or reassortment in different classes of viruses will be detailed. Monitoring and surveillance programs as well as prevention and control measures will be discussed.

Z740: Transboundary diseases **٧٤٠ح: الأمراض العابرة للحدود**

The course covers the general concepts of transboundary animal diseases including avian diseases, as well as small and large ruminant diseases. Categories of transboundary diseases, public health and economic impact, intervention measures in outbreaks, general control and prevention measures will be detailed.

Z741: Advanced Epidemiology **٧٤١ح: وبائيات إنتشار الأمراض متقدم**

The course covers general concepts of epidemiology in disease control and prevention. It describes the etiology and transmission of different diseases, outbreaks' investigations, disease surveillance and screening, bio monitoring and potential intervention measures. Also, types of epidemiological studies, causal inference, andvalidity (precision and bias) in epidemiological studies will be discussed as well as the statistical approaches used in such studies.

Z742: Molecular and Applied microbiology **٧٤٢ح: ميكروبيولوجيا جزيئية وتطبيقية**

The course covers application of molecular tools in surveillance and monitoring of emerging and re-emerging infectious diseases. Genomic library construction of pathogens, and basics of computer-based DNA and protein sequence analysis. Also, it describes the common topics of microbial technology including fermentation and bioreactors. Utilization and application of microbes in production of antimicrobial agents will be discussed.

Z743: Tropical diseases **٧٤٣ح: أمراض المناطق الحارة**

The course covers brief aspects of tropical and subtropical climates and geographic distribution. It describes the distribution, transmission and control of vector-borne diseases, neglected tropical diseases and communicable diseases. Viral diseases in tropics including HIV, hepatitis, dengue and enteric Rota- and Coronaviruses will be addressed. In addition, selected topics on common bacterial and fungal diseases in tropics and subtropics will be considered.