

Course Description

Zoology

Z701: Bioinformatics and phylogeny

701ح: معلوماتية حيوية وفيلوجنى

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.

Z702: Molecular physiology

702ح: علم وظائف الأعضاء
الجزينى

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

703ح: 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)

704ح: فسيولوجيا اللافقاريات (2)

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

Z705: Endocrinology

705ح: 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

706ح: 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

707ح: 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 excretion.

Z708: Genomics and proteomics

708ح: علم الجينوم و البروتيوم

The course deals with genomics classification, structure and organization of prokaryotic genomes, transcriptional regulators of bacterial genes, transposable 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

709ح: 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)

710ح: بيولوجيا الأورام (2)

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- neuroblastoma.

Z711: Applied molecular biology

711ح: 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

712ح: 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

713ح: وراثية 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

714ح: بيولوجيا الخلايا الجذعية

The course covers a brief history of the field, cell potency and different cell lineages. 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

715ح: وراثية 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 convenient 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

716ح: التشخيص والعلاج الجزيئي

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 defect and production of molecular therapeutics and vaccines.

Z717: Experimental embryology and embryonic malformations

717ح: علم الأجنة التجريبي و التشوهات الجنينية

The course describes the gametogenesis, embryonic induction and control of differentiation. Also, it covers the molecular basis of metamorphosis 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

718ح: 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)719ح: حفريات فقارية
(2)

The course describes the following topics: Ordovician vertebrates including the age of spinal lifeforms (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) and quaternary glaciation including the age of modern life (the human era - the pleistocene ice ages -the holocene interglacial - megaherbivore extinction.

Z720: Vertebrates' Biodiversity

720ح: التنوع البيولوجي 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

721ح: بيولوجيا الفقاريات المائية

This course provides an understanding of the evolution, physiology, locomotion and migratory patterns and adaptations of vertebrates to life in the aquatic environment 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)

722ح: 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

723ح: 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

724ح: معالجة التلوث البيئي

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 ح:725 التلوث الصناعي 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 ح:726 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 ح:727 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 ح:728 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 ح:729 مناعة اللافقاريات

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

Z730: Zoonotic parasites ح:730 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 ح:731 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

732ح: 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

733ح: 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 toxicity

734ح: 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 toxicity 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

735ح: 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

736ح: 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

737ح: دراسات متقدمة في الطب الشرعي

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

738ح: ميكروبيولوجي 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

739ح: 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

740ح: 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

741ح: وبانيات 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, and validity (precision and bias) in epidemiological studies will be discussed as well as the statistical approaches used in such studies.

Z742: Molecular and Applied microbiology

742ح: ميكروبيولوجيا جزيئية وتطبيقية

The course covers application of molecular tools in surveillance and monitoring of emerging and reemerging infectious diseases. Genomic library construction of pathogens, and basics of computerbased 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

743ح: 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.