

Course Description

Botany

B701: Genomics	701: علم الجينوم
<p>Genomics classification, Structure and organization of prokaryotic genomes. Transcriptional regulators of bacterial genes. Transposable genetic elements in bacterial genomes. Evolution of bacterial operons and operonisation. Islands and segments of pathogenicity and resistance. Structure and organization of eukaryotic genomes. Repetitive and transposable elements and their effect on genome. Telomeric and subtelomeric regions in chromosomes. CpG methylation and gene silencing. Yeast-two-hybrid system. cDNA microarrays. Evolution and structure of mitochondrial genomes. Genome sequencing: whole shotgun genome sequencing. Sequencing technology: Sanger capillary sequencing, Roche 454 (pyrosequencing), Illumina/Solexa, SOLiD System. Pros and cons of sequencing techniques. Maxam-Gilbert sequencing. ORF and promoter predictions. Intron and exon predictions. Gene annotation. Major genome databases.</p>	
B702: Proteomics	702: علم البروتيوم
<p>Proteomics classification. 1D-SDS-PAGE and 2D-SDS PAGE. Detection and quantitation of proteins in gels. Pros and cons of various staining methods. Basics of mass spectrometry. Maldivof and ESI, and their application in proteomics. Tandem MS/MS spectrometry. Peptide sequencing by tandem mass spectrometry. Affinity purification of protein.</p>	
B703: Advanced Bioinformatics	703: معلوماتية حيوية متقدمه
<p>Bioinformatics and its application. Major online databases. Practical use of databases. DNA, RNA, proteins in bioinformatics. Amino acid classification. Similarity, homology, local and global sequence alignment. Scoring matrices (PAM, BLOSUM). Pairwise alignment. Dot sequence alignment. BLAST. Types of BLAST. How to use BLAST. FASTA. ClustalW. BOXSHADE.</p>	
B704: Quantitative Genetics	704: الوراثة الكمية
<p>This course examines the nature of Mendelian inheritance when extended to quantitative traits that are jointly influenced by the environment and the simultaneous segregation of many genes. Prediction of response to natural and artificial selection in populations will also be studied.</p>	
B705: Plant breeding	705: تربية النبات
<p>This course examines the application of genetic principles to plant improvement. Topics include breeding objectives, mating systems, selection, testing and germplasm maintenance of horticultural and crop plants.</p>	
B706: Laboratory Methods in Molecular Biology	706: طرق المختبر في البيولوجيا الجزيئية
<p>This course involves laboratory based instruction in the basic methodologies of Molecular Biology. Students will have the opportunity to develop technical skills and practical knowledge sufficient to</p>	

perform basic procedures independently, and to diagnose and analyze experimental results obtained with these techniques.

B707: Plant Molecular Genetics

707ن: وراثة جزيئية نباتية

This course studies the molecular genetics of plants. The topics include: plant genome diversity and synteny; Arabidopsis thaliana genome, hormonal, environmental and developmental regulation of gene expression; chloroplast and mitochondrial genomes; and gene expression and silencing in transgenics. The course will be delivered using a lecture and paper discussion format. Students will learn and use a variety of computer techniques to search and analyze plant genome databases.

B708: Advanced Concepts in Genetics

708ن: المفاهيم المتقدمة في علم الوراثة

This course presents classical non-Mendelian phenomena, including analysis of chromosome breakage, transposition, imprinting and paramutation. Modern advances in gene regulation via epigenetic phenomena will be a central theme, focusing on chromatic remodeling, gene silencing and RNA interference as they pertain to organism development, with an emphasis on plants.

B709: Vegetations Analysis

709ن: تحليل الكساء الخضري

Methods of vegetation science including field sampling, classification, gradient analysis, ordination.

Computer analysis includes database construction (Turboveg), table analysis (JUICE), and ordination (PC-Ord).

B710: Ecosystems Analysis

710ن: تحليل الأنظمة البيئية

Nature of ecosystems - How ecosystems work - Energy flow and energetics - Material cycles in ecosystems - Ecosystems in high-stress environments: meeting environmental challenges - The role of disturbance and succession in ecosystem functioning - Biomes: world ecosystem types - Human impacts on ecosystems: humans as an ecological factor - Large-scale human impacts on ecosystems - Global environmental change: ecosystem response and biosphere impacts - The Role of Ecosystem Health Assessment in Environmental Management - Application of Indicators for the Assessment of Ecosystem Health.

B711: Botanical Maps

711ن: الخرائط النباتية

The course contains Introduction, study factors affecting on distribution of wild plants, distribution of wild plants. Using Geographical Information System (GIS) and Remote sensing (RS) to design the botanical maps. Using Global Position System (GPS) to certify the distribution of wild plants. Major types of concept mapping techniques including spider, hierarchy, flowchart, mind maps, logic trees, decision trees, fishbone diagrams, pictorial maps, multi-dimensional/3D maps and Mandela maps.

B712: Ecological genetics

712ن: وراثة بيئية

Ecological genetics is at the interface of three important subdisciplines of biology: ecology, evolution, and genetics. In this course, students will explore basic concepts in population and quantitative genetics focusing on techniques that reveal the genetic structure and adaptive value of ecologically relevant traits. This course will provide a conceptual link between courses focused on genetics and molecular biology and courses focused on whole organisms and their ecology.

B713: Evolutionary Ecology

713ن: علم البيئة التطوري

Empirical and theoretical approaches to key areas of research including natural selection, sexual selection, and life histories. Other topics may include phenotypic plasticity, speciation, coevolution, and quantitative genetics.

B714: Applied Ecology

714ن: البيئة التطبيقية

Integrating ecology and management - Interactions - Community structure - Succession - Closing the gap between science and management - Energy, Carbon Balance and Global Climate Change - Conservation and Management of Wild Species - Restoration of Communities.

B715: Conservation Biology

715ن: الصون الحيوي

Introduction to the scientific discipline that deals with threatened species and habitats. Topics include: biodiversity, extinction, threats, demography, genetic diversity, protecting, managing and restoring ecosystems (e.g., nature reserves, captive breeding, conservation corridors), sustainable development, and global warming. Ties between the study of conservation biology and environmental law, economics, and policy will also be covered.

B716: Population Ecology716ن: بيئة
العشائر

Abundance and distribution of populations; population growth and regulation; fluctuations, stochasticity and chaos; meta-population persistence and extinction; age and stage-structured populations; interactions within and between species; optimal harvesting; spread of infectious diseases. Labs include experiments and computer simulations.

B717: Plant hormones and other growth regulators

717ن: الهرمونات النباتية ومنظمات النمو الأخرى

Concept of hormones as chemical messengers, techniques for detection and quantitation of plant hormone, classical approaches and use of mutants in understanding hormone actions, hormones in defense against abiotic and biotic stresses, synthetic regulatory compounds and their uses.

B718: Enzymes and bioenergetics

718ن: الإنزيمات والطاقة الحيوية

Application of principles of thermodynamics in biology; origin and evolution of biocatalytic reactions; significance of ribozymes; abzymes; artificial enzymes; enzyme technology; regulation of enzymatic activity; evolution of electron transport chain and its coupling to ATP synthesis; bioelectricity, photosynthesis and respiration.

B719: Plant metabolism regulation

719ن: تنظيم أيض النبات

The course aims to improve student competences in Plant Metabolism, therefore requiring basic knowledge in biochemistry. Unique plant biochemical features and how they relate dynamically to plant performance will be considered, i.e. metabolic regulation, primary and secondary metabolism, and integration of events at different levels of analysis (from biomolecules to plants). The course highlights the need and the relevance of integrating metabolic events within the plant and its environment. Students will acquire the necessary skills to assess in a critical way the complexity of the plant system and its ability to adapt. Students will also develop the ability to critically analyse and present a research paper related to plant metabolism.

B720: Advanced mycology and mycotoxins

720ن: بيوتكنولوجيا النبات

Introduction to gene cloning, plant tissue culture and transformation, and the development of agriculturally important transgenic traits. Critical thinking, case studies, and discussions are used to

examine global approaches to the regulation and risks of genetically-modified organisms, plant and gene patents, and the consequences of these factors on food sovereignty and trade.

B721: Plant Secondary Metabolism

721ن: أيض النبات الثانوي

A study of the role and biosynthesis of the diverse array of secondary natural products produced by plants. Secondary metabolites are divided into three main classes: alkaloids, isoprenoids/poly acetates and phenolics. For each class, the biosynthesis, physiology, ecology and biological activity of representative compounds will be discussed.

B722: Protein structure

722ن: تركيب البروتين

Hierarchical structure of proteins; folding; ticketing; degradation; purification, detection and functional characterization; sequence alignments; molecular motors and pumps.

B723: Fruit development and ripening

723ن: تطور ونضج الثمار

Stages of fruit development and their regulation, biochemical and related events during fruit ripening in climacteric and non-climacteric fruits, physiology and biochemistry of fruit abscission, post-harvest changes, production of transgenic fruits.

B724: Egyptian flora

724ن: الفلورا المصرية

Historical notes on the flora of Egypt- Flora of Nile region and Oasis, Flora desert and semi-desert-Flora of Sinai peninsula and Gable Elba.

B725: Numerical taxonomy

725ن: التصنيف العددي

Introduction to the numerical approach to taxonomy. Aims and principles of numerical taxonomy. Selection of taxonomic characters. Application of numerical taxonomy for biological disciplines. Advantages and problems with numerical taxonomy.

B726: Biodiversity

726ن: التنوع الحيوي

This course examines the biology, ecology, and evolutionary relationships among living organisms. All forms of life will be considered, from single celled prokaryotes to multicellular eukaryotic plants.

B727: Chemotaxonomy

727ن: التصنيف الكيميائي

Introduction, historical review, Chemotaxonomic investigation. Characters of taxonomic molecules. Classification of molecules, macromolecules, micro molecules. Allozymes, Semantides, Serology and Electrophoresis. Evidence from phenolic and betalains. Evidence from alkaloids. Evidence from carbohydrates.

B728: Phylogeny

728ن: التصنيف التطوري

This course covers the basic methods of phylogenetic analysis and their application in fields such as systematics, comparative biology, and molecular evolution. Lectures will emphasize the logical basis and computational details of various tree-building algorithms and associated methods of hypothesis testing, as well as novel applications of phylogenetic analysis in various fields of biology. Computer-based labs will give students the opportunity to implement these methods using a variety of phylogenetic software.

B729: Bacterial biotechnology

729ن: تقنية حيوية بكتيرية

Introduction to biotechnology, genetic recombinant bacteria, genetic approaches for improving bacterial strains, selective isolation of mutants, kinetics of bacterial cell growth. role of biotechnology in production of antibiotics, vitamins, enzymes and food additives. Production of insulin, interferon and growth hormones in bacterial cells using genetically microbial biocatalysts. Bacterial bioremediation and bio-fertilizers.

B730: Fungal biotechnology

730ن: تقنية حيوية الفطريات

Introduction of Mycology, Production techniques used in fungal Biotechnology, Production of Biochemicals by fungi, Fungi in Medical Biotechnology, Industrial uses of Fungi, Fungal Biodeterioration & biodegradation, Fungi in food industry, Fungi in Agricultural biotechnology, Biotechnology and the control of pathogenic fungi, Postscripts: Recent application of Fungal Biotechnology, Screening of fungal metabolites.

B731: Algal biotechnology

731ن: تقنية حيوية الطحالب

This course will provide an overview of the growing field of algae biotechnology by introducing the basics of photosynthetic bio-manufacturing. The topics covered will include the biofuels, feeds and foods, nutraceuticals, industrial enzymes and therapeutic proteins. It will also cover the basics of algae biology and its importance as a feedstock, the biochemical, genetic and molecular approaches being developed to advance the next generation of bio-products, and the economical and global impacts of algal biomass production. Overall, the course will emphasize the importance of photosynthetic biomanufacturing development as a contributor to replacing the diminishing supplies of fossil fuels, reducing global warming, and creating a sustainable society.

B732: Industrial Microbiology

732ن: ميكروبيولوجيا صناعية

Physiology, nutrition and growth of microorganisms important to various industries. Control of microbial growth in industrial production process. Application of microorganisms in production of cells, primary and secondary metabolites.

B733: Plant viruses733ن: الفيروسات
النباتية

Plant virus structures, Nomenclature and classification, genome organizations and replication strategies. Symptoms and diagnosis of virus diseases of plants. Host factors involved in virus multiplication, Host defense. Plant viruses as useful tools.

B734: Marine Algae

734ن: الطحالب البحرية

The course presents an overview of algal systematics and phylogeny based on morphology, ultrastructure, reproduction and molecular data. It also includes plankton and benthic algal ecology and biogeography with emphasis on Egyptian conditions.

B735: Microbial Genetics

735ن: وراثية ميكروبية

Genetic system of Bacteria, Microbial transformation, Microbial transduction, conjugation. recombination in bacteria, fungi and viruses, Yeast genetics, plasmids , victors and DNA analysis in microorganisms, modern techniques in DNA analysis , bacterial genetic materials. Structure and organization of gene, Genetic elements, replication and repair of nuclear gene, molecular base of genetic change, DNA structure, recombination and evolution.

B736: Microbial toxins

736ن: السموم الميكروبية

Toxigenic microorganisms. Structure and formation of microbial toxins .Mycotoxins (Aflatoxins B1, B2,G1, G2, Zearalenone, Trichothecene, Ochratoxins,Patulin, Ergot toxins, Mushroom toxins).

Implication of microbial toxins in human and animal diseases. Natural occurrence of microbial toxins. Control of microbial toxins.