



Course description for the courses taught by the Department of Biological Sciences B.Sc.

- 0304101 General biology (1) (Credit Hours:3)**
Prerequisite: -
Internal structure of the cell, molecules of the cell, metabolism, respiration and photosynthesis, cell-cell signaling, cell division, Mendelian inheritance, molecular biology of the gene, DNA technology, chemical signals in plants and animals, phylogeny and systematic introduction to ecosystems.
- 0304102 General biology (2) (Credit Hours:3)**
Prerequisite:0304111 or concurrently
Animal and plant tissues, Mammalian circulation, immune system, gas exchange, controlling the internal environment, nervous system and motor mechanism. Transport in plants, plant nutrition, plant reproduction and development. Eco-distribution and adaptations of organisms, population ecology and community ecology.
- 0304105 Cellular and Molecular biology (Credit Hours: 4)**
Prerequisite: 0304101
Structure and function of cell organelles and macromolecules; research methods in cell and molecular biology.
- 0304111 Practical general biology (Credit Hours:1)**
Prerequisite:0304101 or concurrently
Laboratory experiments in microscopy and cells, chemical aspects of cells, plant and animal tissues, animal and plant physiology. Mammalian anatomy, and systematic of major living groups.



0304223 Laboratory Instruments (Credit Hours:2)

Prerequisite:0304101

Principles & methods of calibration and maintenance of the basic laboratory instruments including spectrophotometers, flame photometers, centrifuges, Microscopes, blood cell counters and analyzers, clinical chemistry analyzers, electrophoresis and chromatographic equipments, water baths, incubators, ovens, balances, distillers, sterilizers, lyophilizers, pH. Meters and ion selective electrodes, osmometers, blood gas meters and volumetric equipment.

0304231 Cell Biology (Credit Hours:2)

Prerequisite:0304102

This course deals with the cell as a unit of structure of all living organisms. It includes: Cell theory. Principles and technology of microscopy, biological membranes: Ultrastructure and function and their role in controlling cellular responses to cell matrix. Intracellular compartments: Endoplasmic reticulum, golgi complex, lysosomes and peroxisoms ultrastructure and function. Energy transformers: Mitochondria and chloroplasts. The course concentrates also on the nuclear ultrastructure. Chromatin and DNA packaging. Nucleolus and ribosome's biosynthesis. Cell cycle and mechanism of cell division. Also studies cellular junctions. Adhesions and extracellular structures. Cell-to-substratum interactions. Transient differentiations associated with surface activity. Motile cell processes. Plant cell wall and plasmodesmata and bacterial cell wall. The course investigates also the structural elements of cytoskeleton, microtubules, microfilaments and intermediate filaments ultrastructure and functions. Cellular movement: motility and contractility and cell-to cell signaling. The course deals also with cellular aspects of cancer, aging and death.



- 0304251 General Botany (Credit Hours:4)**
Prerequisite: 0304102
Plants on our planet , the plant body, the plant cell, the tissues, the root, the stem the leaf, the flower, inflorescence, the fruit, seed and seedling, plant development, plant groups, plants and man (economic, medicinal, poisonous, ..) , climate and phytogeography.
- 0304261 General Zoology Credit Hours:4**
Prerequisite: 0304102
Introduction to the living animal continuity and evolution, principles of genetics, organic evolution, reproduction and development, diversity of animal life (structural patterns, classification and phylogeny, principles of nomenclatures); invertebrate and vertebrate animals; activity of life; behavior; animal environment and its influence on its distribution and adaptations.
- 0304281 General genetics (Credit Hours:3)**
Prerequisite: 0304102
Mendelian genetics; statistical and pedigree analysis; sex determination; gene linkage and recombination; extranuclear inheritance; modification in chromosome number and structure; fine structure of the gene; the molecular structure of the gene and its replication; transcription; gene action and regulation of gene expression, molecular basis of mutagenesis; population genetics, genetic engineering and laboratory work in basic genetics.



0304282 Human Genetics (Credit Hours:3)

Prerequisite: 0304102

DNA structure, techniques of gene analysis, chromosome structure and cell division, immunogenetics, Cancer, genes in kindreds, somatic cell hybridization, cytogenetics, multifactorial inheritance, the human gene map, heritability, population statistics, genetic testing in individuals and populations, human biochemical disorders, gene therapy, hereditary defects with altered drug responses, genetic counseling.

0304321 Biochemistry (Credit Hours:4)

Prerequisite: 0303233

This course deals with acids, bases and buffers. The purification and isolation of macromolecules is stressed as an introduction to the study of proteins and nucleic acids. The course deals with the structure of proteins in general and the function of enzymes. Biochemical aspects of nucleic acids including gene expression and regulation are stressed. The course culminates in an overview of carbohydrates, lipids and integrated cellular metabolism.

0304323 Clinical chemistry (Credit Hours:4)

Prerequisite: 0304321 or concurrently

Essentials of clinical chemistry that related to the biochemical basis of diseases and the principals of laboratory diagnosis particularly in the following conditions ; inborn errors of metabolism, disorders of plasma proteins, plasma enzymes, acid-base balance, blood gases,



electrolytes, carbohydrates, lipids, nitrogen metabolites, calcium and phosphate, renal and liver function tests. Also exposing the student to the routine biochemical tests used in the diagnosis of diseases

- 0304341 General Microbiology (Credit Hours:4)**
Prerequisite: 0304321
History and scope of microbiology ; prokaryotes cell structure and function; metabolism and nutrition , microbial growth, requirements for growth , environmental factors affecting growth, effect of antimicrobial agents on growth; microbial genetics, and gene cloning , bacterial reproduction, microbial taxonomy, major groups of bacteria, microorganisms and environment, elements cycling ; symbiotic associations; immune response and antigen – antibody reactions in vitro.
- 0304342 Medical microbiology (Credit Hours:3)**
Prerequisite: 0304341
Parasite-host relations in selected infectious diseases, role of bacteria, fungi, viruses in pathogenesis, clinical symptoms, lab diagnosis and prevention
- 0304351 Plant Anatomy and Development (Credit Hours:3)**
Prerequisite: 0304251
A study of the functional aspects of the internal structure for all plants vegetative and reproductive organs and development of vascular plants
- 0304352 Plant Physiology (Credit Hours:3)**
Prerequisite: 0304101
Plant water relations: absorption, transport and transpiration. Mineral nutrition, photosynthesis, phloem translocation,



phytohormones. growth, dormancy ; seed germination, phytochrome and phtomorphogenesis and stress physiology

0304354 Medical Mycology (Credit Hours:3)

Prerequisite: 0304341

Objective study of fungi causing human external and internal diseases: Topics include introduction to fungi, classification, biology, infection modes, prevention, diseases caused by these fungi and treatment.

0304361 Vertebrate Anatomy (Credit Hours:3)

Prerequisite: 0304261 for biology students

0304102 for medical analysis students

Using embryonic, morphological , and developmental patterns in the anatomy of vertebrates Dissecting samples of vertebrate classes in the laboratory

0304362 Developmental Biologg (Credit Hours:3)

Prerequisite: 0304361 for biology students

0304102 for medical analysis students

This course deals with the following topics: Male reproductive system, spermatogenesis, oogenesis, fertilization, assisted reproduction technology, cleavage, gastrulation, neurulation, and early human development.

In addition, the course covers development of the following: The skin and its derivatives; the central nervous system, the sense organs; the heart and major blood vessels, the excretory and the reproductive systems, the limbs, the digestive system; the respiratory system. Also a study of the fetal membranes, parturition, and twinning is covered.

0304363 Animal physiology (Credit Hours:4)

Prerequisite: 0304361 for biology students

0304102 for medical analysis students

The physiologic concepts related to the organ systems including the nervous, muscular, endocrine, cardiovascular,



excretory and respiratory system are studied. Special emphasis is given to the molecular aspects of the signal transduction mechanisms.

- 0304367 Haematology (Credit Hours:4)**
Prerequisite: 0304363 or concurrently
Formation and functions of blood cells, metabolism of iron, folate B12 and hemoglobin, blood volume and its changes, types of hemolysis and diagnostic tests, bleeding disorders, leukocyte diseases
- 0304368 Medical parasitology (Credit Hours:3)**
Prerequisite: 0304102
Introduction to parasitism, hexapods and other arthropods that serve as vectors to human diseases, life cycles of parasites of medical significance (Unicellular or multicellular including worms), pathological effects, lab diagnosis, prevention and treatment.
- 0304369 Blood bank (Credit Hours:2)**
Prerequisite: 0304367 or concurrently
Blood grouping, withdrawal, transfusion and related tests
- 0304382 Molecular Biology (Credit Hours:3)**
Prerequisite: 0304341
The lectures in this course covers the following topics; historical back ground; chemistry of nucleic acid; Watson-Crick model of DNA; physical and chemical properties of nucleic acids; an introduction to gene function (selection, transcription and translation); transcription in prokaryotic cells; regulation of transcription in prokaryotic cells; transcription in eukaryotic cells; regulation of transcription in eukaryotic cells; general and specific transcription factors;



post transcriptional events ; translation and the genetic code; post translational events; DNA replication in prokaryotic and eukaryotic cells; Mutation and DNA repair. the laboratory covers the following topics: Isolation of nucleic acids; quantitative and qualitative measurements of nucleic acids; the use of restriction enzymes; Amplification of nucleic acids; characterization and manipulation of the recombinant plasmid pGLO containing GFP gene; bacterial transformation and gene expression and protein produced isolation ; DNA-cloning and southern blot.

0304383 Biotechnology (Credit Hours:3)

Prerequisite: 0304341

The course introduces both principles and application of recombinant DNA technology to microbes, animals and plants in the hop of using genetically engineered products to clear the environment and improve human health prospects. This would be achieved trough tackling the history of biotechnology, basic principles of recombinant DNA technology, common methods of applications of animals, human and medical biotechnology. Common methods of applications of plant biotechnology. Methods of applications of microbial and environmental biotechnology. Ethical issues of biotechnology and patenting. Current societal issues in biotechnology and bioethics.

0304400 Training for Medical Laboratory Analyses (Credit Hours:8)

Prerequisite: Department approval

The student will be trained 24 hours weekly during summer semesters after completing the 3 year in the Official Medical



laboratory recognized by the Department of the Biological Sciences and University of Jordan. The training will include basic concepts in clinical Chemistry, Medical Microbiology, blood endocrinology, Blood banking, Parasitology, Immunopathology. The students will be supervised by a departmental member for training purposes. The graduate mark will be pass or fail.

0304421 Metabolism (Credit Hours:3)

Prerequisite: 0304321

Metabolism (anabolism and catabolism) of the main organic molecules in the living cell which includes carbohydrates, lipids proteins and nucleic acids with the emphasis on energy metabolism and the role of vitamins as cofactors for enzymes' action.

0304423 Quality Assurance in Laboratory Analyses and Laboratory Management (Credit Hours:2)

Prerequisite: 0344323 or concurrently

Definitions, principles and basic procedures of quality assurance in clinical laboratory analysis and also the application of internal and external quality assessment programmers. Planning of laboratories design, structure and managing the man power for the sake of optimum use of the available resources: man power, instrumentation analytical and consumable. Professional skills for training management reporting and safety of local and international accreditation standards.

0304432 Histology (Credit Hours:3)

Prerequisite: 0304261 for biology students
0304102 for medical analysis students

This course covers the following topics: types of tissues,



characteristics, structural and functional aspects of the following tissues: epithelial, connective, cartilage, bone, blood, muscular and nervous. In addition, the course deals with study of histology of the following systems: integumentary; lymphoid, digestive, respiratory, excretory, reproductive, and endocrine.

0304441 Applied Microbiology (Credit Hours:3)

Prerequisite: 0304341

Food as a substrate for microorganisms, factors affecting growth in food; microorganisms important in food, principles of food preservation, food borne diseases and toxins. Industrial microbiology: primary and secondary metabolites, downstream processing, strain development, microorganisms as food, microbial transformation, water pollution and sewage treatment, microbial treatment and utilization of waste.

0304443 Immunology (Credit Hours:3)

Prerequisite: 0304321 for biology students
0304102 for medical analysis students

This course aims to introduce the student to concepts of immunology. Including basic components of innate and acquired immunity, genetic basis of antibody diversity, mechanisms of immune response both humoral and cell mediated, role of major histocompatibility complex (MHC) in immune response, biology of T- and B- lymphocytes, cytokines and complement system. Moreover, the course will cast a light on special cases of immune-disfunctions such as hypersensitivity, autoimmunity and immunodeficiencies. The practical part of the course will introduce the student to basic immunological techniques. The protocols include those for the detection of antigen-



antibody interactions, lymphocyte proliferation as well as flowcytometry.

0304445 Virology (Credit Hours:2)

Prerequisite: 0304341

Virus structure, viroids, satellites, prions, virus evolution, multiplication of viruses, virus taxonomy, viral pathogenesis, viral persistent, latency, patterns of some viral diseases of human, cell transformation by viruses, host-immune response to viral infections, interferons, antiviral agents, immunization and vaccination.

0304452 Taxonomy of Flowering Plants (Credit Hours:3)

Prerequisite: 0304251

Taxonomy of flowering plants, plant according to simple principles, aims to taxonomy, historical summary, phytogeography, and terminology of plant description, field and herbarium methods, nomenclature, concepts of taxa, construction and use of keys, taxonomic literature for such study of the characteristics of about 48 families of plants in Jordan.

0304463 Endocrinology (Credit Hours:3)

Prerequisite: 0304363

The function and organization of the major endocrine glands in mammals with emphasis on molecular endocrinology. It also includes the biosynthesis, secretion, metabolism, mechanism and physiological action of the hormones. Some endocrinological disorders resulted from hyposecretion or hypersecretion of hormones will be studied.

0304464 Comparative Animal Physiology (Credit Hours:3)

Prerequisite: 0304363



A comparative study of the differences and similarities in the functional processes of animals at selected levels of phylogeny with an emphasis on physiological variation and how different species use different physiological strategies to achieve the same body function. It will include also the molecular and cellular bases for physiological regulation, bioenergetics as well as the functions of the major body systems such as respiratory, excretory, gastrointestinal, cardiovascular, haemopoietic, endocrine and nervous systems.

0304465 Evolution (Credit Hours:3)

Prerequisite: Department approval

A review of the history of evolution and evidence for it, biogeography; natural barriers and oceanic islands; fossils and fossilization, origin of life, biogenetic law; the origin of variation and the genetic basis of evolution, natural selection, adaptation and evolution; species and speciation; rates of evolutionary changes, ecology, behavior, and evolution; human evolution; the primates and apes; family Hominidae; major functional and structural changes in relation to new habitat; origin of man; genus *Homo*, and the rise of modern man.

0304466 Laboratory animals (Credit Hours:2)

Prerequisite: 0304363

Importance, history, definition, general environment, use and advantages of laboratory animals; animal models for research; nutrition of laboratory animals; housing and caging; reproduction and breeding; diseases and disease control; management and supply of animals; production methods; transport of laboratory animals; preparation for surgical procedures and post operative care.



- 0304471 Ecology (Credit Hours:3)**
Prerequisite: 0304102
Basic concepts in ecology; organization, structure and function of ecosystem and ecosystem properties; cycling of matter and flow of energy in ecosystems and their equilibrium; factors involved in the regulation, growth, and general dynamics of populations; data needed to describe populations, population growth, population models, and regulatory mechanisms; spatial and temporal variation and properties of populations; community structure and interactions; succession patterns in aquatic and terrestrial communities; field trips to the different vegetation types in Jordan and analysis of quantitative data from the field.
- 0304472 Marine Biology and Ecology (Credit Hours:3)**
Prerequisite: 0304261
Physical and chemical properties of water; basic oceanography; some ecological principles; division of the marine environment; planktons; oceanic nekton; deep sea biology; shallow-water subtidal benthos; intertidal ecology; meiofauna; tropical communities; symbiotic relationships; human impact on the sea.
- 0304491 Seminar (Credit Hours:1)**
Prerequisite: Department approval
Library use, reference collection, reference organization, presentation of term paper and a short talk using the collected references.
- 0304492 Research (Credit Hours:2)**
Prerequisite: Department approval



The student chooses a research project in one of the fields of biological sciences which he/she must complete and write in an acceptable scientific manner during the semester (Only students with total average of B and above are allowed to register for this course).