UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Introduction To Biology

2223-1-F8203B005

Learning objectives

The course provides basic knowledge of biology and the ability of understand the mechanisms underliyng the main biological processes to address biological issues on a statistical basis.

Contents

The course is divided in three macro-topics (biochemistry, genetics and pharmacology) and it imparts basic knowledge of general and organic chemistry and deals with the major classes of biological molecules, especially proteins and nucleic acids, with regard to structure and function. Basic knowledge of structural organization of the cell and an overview of metabolism are also imparted. Genetic material. Principles of heredity. Quantitative genetics. Population genetics. Microarrays. Pharmacokinetics. Pharmacodynamics. Pharmacotoxicology.

Detailed program

Elements of biochemistry: theory of chemical bonding (ionic and covalent bonds); the main classes of organic compounds; noncovalent interactions and their role in the structure of biological molecules; concept of concentration; chemical equilibria; the pH and its role in biological processes; buffer solutions; the main classes of compounds of biological interest and their structural and functional roles; carbohydrates; lipids; nucleotides and nucleic acids; DNA and RNA structure;
structure of amino acids in proteins; the peptide bond; protein structural levels (primary, secondary, tertiary and quaternary); functional roles of proteins; examples of proteins with prominent biological role; the structural organization of living systems; differences in structure and general organization of prokaryotic and eukaryotic cells; structure and life cycle of viruses; the central role of ATP in energy metabolism; the oxidative metabolism; vitamins and hormones.

Elements of genetics: physical basis of heredity (chromosomes, mitosis, meiosis); DNA replication and transcription; Mendelian genetics; Quantitative Genetics; population genetics (Hardy-Weinberg equilibrium, polymorphism of natural populations, changes in gene frequencies); principles of microarrays.
Elements of pharmacology: drug definition, agonists, antagonists, inverse agonist and partial agonist; pharmacokinetics (drug drug absorption, distribution and excretion); pharmacodinamics (mode of action of a drug, examples of different classes of drugs, studies on drug-response curves). Nervous system (action potential, neurotransmitters, synapses, functional anatomy). Muscular system (skeletal, smooth and cardiac muscles. Muscular contraction). Kidney. Blood. Immune system.

Prerequisites

None

Teaching methods

Lectures will be delivered face-to-face and recordings of the individual lectures will then be uploaded onto the e-learning platform for a limited time.

Assessment methods

The couse is divided in three macro-topics (biochemistry, genetics, pharmacology) and the assessment included three distinct tests, an oral one of biochemisty and pharmacology and a written one of genetics. The written test of genetics includes open questions to verify the acquisition of the theoretical principles of the subject and two practical exercises. The tests will be the same for attending or not-attending students. On-going tests are planned.

Textbooks and Reading Materials

Teaching material will be provided at the beginning of the course.

Semester

The course will take place in the first and second cycle of the academic year.

Teaching language

Italian.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION