UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biochimica

1920-1-I0102D001-I0102D001M

Aims

The student must know: the structure and function of cellular components and molecular mechanisms and the qualitative and quantitative knowledge of biological phenomena

Contents

The module aims to transmit the knowledge of the structure and function of the various components of eukaryotic cells, the molecular mechanisms involved in cell, biochemistry pathways and the cellular metabolism

Detailed program

The atomic structure, its importance in relation to the chemical behavior of the elements. The interactions between atoms that give rise to the formation of compounds. The solution behavior of compounds with particular reference to aqueous solutions of acids and bases, buffer solutions. Qualitative and quantitative aspects of chemical reactions. The classification of organic compounds addressed the structure of compounds of biological interest: proteins, lipids and carbohydrates. Knowledge of energy metabolism and enzymes, of the regulation of metabolism through the hormonal system and of the principles of nutrition. Chemistry: knowledge of the composition of the matter, of the atomic structure and main chemical bonds (ionic, covalent, and hydrogen bonds). Basic knowledge of the nomenclature. Definition of atomic and molecular weight, and mole. Mixtures: classification and definition of solution, and solubility. Properties of solutions: osmotic pressure. How to express the concentration of a solution. Chemical reaction: reversible and irreversible reactions, activation energy. Law of conservation of mass. Endergonic and exergonic reactions. Definition of equilibrium constant and kinetics. The chemical equilibrium:

effect of changes of concentration, temperature and catalysts. Oxidation-reduction (redox) reaction. Acids, bases, buffers: Definitions of acids and bases (conjugate acid-base pairs) and their solutions. Definition of pH. Acids and bases strengths. Buffer solutions: definition. Organic chemistry: classification of organic compounds and main functional groups: saturated and unsaturated compound, aromatic hydrocarbons, alcohols and thialcols, carbonyl compounds, carboxylic acids, amines, aldehydes, ketones, esters, ethers. Isomers. Stereoisomerism. Protein: amino acid structure. Intramolecular and intermolecular bonds. Isoelectric point. Definition of primary structures, secondary, tertiary, quaternary. Lipids: classification. Hydrolysis of complex lipids. Free fatty acids: nomenclature, saturated, unsaturated. Simple and complex lipids. Steroids. Carbohydrates: classification, aldose and ketoses. Isomers (D and L). Open and closed structures: ? and ? anomers. Glycosidic bond and major disaccharides. Structural polysaccharides and energy reserve. Biochemistry: introduction course and general information on living matter. Biochemical reactions, enzyme, Enzyme Kinetics, regulation. Bioenergetics, oxidative phosphorylation, respiratory chain. Carbohydrates: digestion, absorption, aerobic and anaerobic glycolysis; gluconeogenesis. Pentoses phosphates Shunt. Glycogen and blood glucose regulation. Lipids: digestion, absorption; lipolysis; biosynthesis; the Krebs cycle; ketone bodies; cholesterol; phospholipids; glycolipids; lipoproteins. Proteins: digestion, absorption; metabolism; the urea cycle. Nucleotides: synthesis and catabolism. Second messengers and hormones. Nutrition and vitamins.

Prerequisites

Teaching form

Lectures

Textbook and teaching resource

Bertoldi M., Colombo D., Magni F., Marin O., Palestini P. Chimica e Biochimica (2015) Edises;

Nelson D.L. and Cox M.M. Introduzione alla Biochimica di Lehninger (2015) Zanichelli.

Semester

First year, I semester

Assessment method

Written examination- 17 multiple choice and 1 open ended questions - Oral on evaluation of teachers

Office hours

by appointment