



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry

2627-1-I0204D001-I0204D00101

Aims

The course aims to teach the basic mechanisms that regulate the molecular organization, the biochemical reactions, the cellular and sub-cellular morphology and the metabolic pathways.

Contents

The student will learn 1) the general information on the molecules that make up living matter; 2) the structure, function, mechanism of action of enzymes and their role in metabolic regulation; 3) the mechanism by which the living organism produces energy; 4) nutritional aspects as a source of energy in everyday life and in physical exercise; 5) digestive processes, the molecules involved in energy metabolism.

Detailed program

Course introduction and general concepts of living matter: Introduction to Biochemistry and to the fundamental characteristics of living matter. Organization of biomolecules and general principles of biochemical transformations. Structural Biochemistry: Structure and properties of the main biomolecules: carbohydrates, lipids, proteins, and nucleotides.

Enzymology: Biochemical reactions, enzymes, enzyme kinetics (V_{max} and K_m), and main mechanisms of regulation of enzymatic activity.

Bioenergetics: General principles of cellular bioenergetics. Mitochondrial respiratory chain and oxidative phosphorylation.

Energy metabolism: General principles of energy metabolism. Caloric value of nutrients, caloric equivalents, and utilization of different energy substrates.

Digestion and absorption: General principles of nutrient digestion and absorption.

Carbohydrate metabolism: Digestion, absorption, and transport of glucose and other monosaccharides. Glycolysis: key steps, energy yield, and regulation. Fate of pyruvate under aerobic and anaerobic conditions (lactic fermentation). Glycogen synthesis (glycogenesis) and glycogen breakdown (glycogenolysis) and their hormonal regulation. Gluconeogenesis: general principles and role in maintaining blood glucose levels. Pentose phosphate pathway: main functions (production of NADPH and ribose-5-phosphate). Integration of carbohydrate metabolism in the fed and fasting states.

Overview of lipid and protein metabolism: General principles of lipid and protein metabolism.

Prerequisites

Biology and Chemistry

Teaching form

6 hr (3 classes of 2 hr): In presence frontal lectures

2 hr (1 class of 2 hr): Online live (or not) lesson

Textbook and teaching resource

Slides.

Suggested books:

Siliprandi Tettamanti Biochimica Medica V Ed Piccin

Di Giulio A., Fiorilli A., Stefanelli C., Biochimica per le scienze motorie, Casa Ed Ambrosiana

Bertoli, Colombo, Magni, Marin Palestini Chimica e Biochimica Edises anche in e-book

Nelson and Cox Fondamenti di biochimica di Lehninger Ed Zanichelli 2021 anche in e-book

Semester

1st year, I semester

Assessment method

Written test: questions aimed at evaluating the acquisition of the notions indicated in the section detailed program. 15-20 multiple choice and true/false questions.

Office hours

on appointment: claudia.corbo@unimib.it

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY
