UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry

2425-2-E0201Q049

Aims

This course aims to provide students with a comprehensive view on the mechanisms of action of biological molecules and on metabolic pathways. Knowledge acquired in previous courses will be applied in a quantitative way to biological processes.
Knowledge and understanding. Understanding and interpreting biochemical processes through the principles of chemistry and physics
Applying knowledge and understanding. Students will learn how to apply knowledge to solve problems and to plan experiments in the field.
Making judgements. Students will learn to evaluate information provided and to bring it in relation with other scientific issues
Communication skills. Students will learn to correctly discuss and present biochemical topics issues
Learning skills. Students will become able to analyze scientific literature and to apply and integrate knowledge and information

Contents

This course deals with the biochemical bases of cell function. Major topics are structure/function relationships in proteins and enzymes, principles of bioenergetics, general aspects of catabolism and anabolism. Metabolic pathways are described at different level of detail and regulation and integration thereof are analyzed.

Detailed program

Introduction: principles and rules of biological chemistry
a) Proteins

Amino acids, peptide bond, primary, secondary, tertiary and quaternary structure. Principles of protein folding. Techniques of protein purification and analysis
Transport of oxygen: myoglobin and hemoglobin
Enzymes
Mechanisms of catalysis. Examples of enzymes: serine protease, lysozyme, enolase
Enzyme kinetics and regulation (activation, inhibition, allostery)
b) Metabolism
Bioenergetics, high-energy compounds, coupled reactions, biological oxidation and reduction reactions
Glycolysis, gluconeogenesis and glycogen metabolism
Citric acid cycle
Catabolism and synthesis of lipids
Amino acids metabolism, the urea cycle
Electron transport and oxidative phosphorylation
c) Metabolism integration and regulation
Fundamentals of metabolic regulation

Prerequisites

Background: General and Organic chemistry; Introductory Biology
Specific prerequisites: Organic chemistry
General prerequisites: Students can take the exams of the second year after passing the examinations of Introductory Biology, General and Inorganic Chemistry, Mathematics, and Foreign Language.

Teaching form

Teaching activities are conveyed by means of face-to-face lectures and organized in 32 2-hours-lectures consisting of:

- a section of delivered didactics (Didattica erogativa, DE) focused on the presentation-of contents by the lecturer.
- a section of interactive teaching (Didattica Interattiva, DI) including teaching interventions supplementary to delivered didactic activities, short interventions by trainees, exercises).

To help students prepare for the exam 16 hours supplementary activities supervised by a tutor are offered
Teaching language: Italian.

Textbook and teaching resource

Learning material is available at the e-learning platform of the course.

Recommended textbooks:
- D.L. Nelson, M.M. Cox: I principi di Biochimica di Lehninger, Zanichelli; C.K. Mathews, K.E. van Holde et al: Biochimica,
- Piccin; D. Voet, J.G. Voet, Pratt: Fondamenti di Biochimica, Zanichelli; Nelson e Cox: Introduzione alla Biochimica di Lehninger Zanichelli

Semester

First semester

Assessment method

The exam consists of a written and an oral exam. The written part is based on exercises that involve calculations and short open questions. Only those who pass the written exam can access the oral exam which must be taken in the same session and covers the entire program.

For students attending in the current year, the total written test can be replaced with two ongoing tests which take place halfway and at the end of the course. Only those who pass the first test can access the second one. The total result of the partial tests is valid until the April session of the same academic year. The grade of the partial tests, together with that of the oral exam, contributes to defining the final grade.

For those who have not taken the partial tests, there are overall written exams

Office hours

Contact: on demand, upon request by mail to lecturer

Sustainable Development Goals

QUALITY EDUCATION