UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry

2021-2-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

In the Covid-19 emergency period, lessons will take place through asynchronous recorded lessons and some videoconferencing events.
Tutorials (20 h): classroom supplementary activities hrough exercises on selected course topics.
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

Written+oral examination. Written parts contain problems and questions covering the whole program. The oral examination is on the whole course content.
Students attending the course can replace the written examination with two midterm written exams. Students with sufficient marks in both of them can directly take the oral examination by April of the same academic year. Midterm marks, along with the evaluation of oral examination, concur to the final grade.

During pandemic Emergency, oral exams will be carried out. Ability to solve problems and knowlege of chemical structures will be assessed

Office hours

Contact: on demand, upon request by mail to lecturer