UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry and Molecular Biology

2425-2-H4101D006

Aims

The objective of the course is to provide the concepts necessary to understand biological phenomena and the energy variations connected to them; to lay the foundations for the molecular understanding of the complex processes underlying the metabolism of living beings; to describe with biochemical and molecular language, the correlation between function and molecular structure, the complex phenomena of communication, interaction and control of cellular and tissue functions; to analyze nutritional aspects as a source of energy in life.

Contents

Introduction to biochemistry. Bioenergetics. Enzymology. Diagnostic use of enzymes and isoenzymes. Bioenergetics: respiratory chain and oxidative phosphorylation. Glucose metabolism: digestion, absorption. Aerobic and anaerobic glycolysis. Regulation of glycolysis. Glycogen synthesis and glycogenolysis and regulation. Galactose and fructose metabolism.
Lipid metabolism: digestion and absorption. Catabolism of lipids. Citric acid cycle. Lipogenesis. Regulation of lipolysis and lipogenesis. Metabolism of cholesterol and its derivatives. Metabolism of ketone bodies. Lipoprotein metabolism of plasma lipoproteins.
Protein metabolism: digestion, absorption, and transport of amino acids. General metabolism of amino acids. Urea cycle. Gluconeogenesis and its regulation. Purine and pyrimidine metabolism. Hormones metabolism
Organ biochemistry. Blood, Liver, Central Nervous System, Muscle tissue, Adipose tissue.
Control of cellular-gene metabolism. Hunger and satiety hormones and regulation of body . Metabolic syndrome. Supplements, phytochemicals and health
Biochemistry of the tumor cell. Effect of air pollution on human health. Nanomedicine
Biochemical aspects of digestion and absorption of nutrients. Basal metabolic rate. Principles of power and fat-soluble vitamins. Homeostasis of carbohydrates, lipids and proteins. The fasting feeding cycle

Detailed program

See the extended program of the individual modules

Prerequisites

To take the Biological Chemistry and Molecular Biology exam, it is necessary to pass the Propaedeutic Sciences

Teaching form

DE- Lessons of 2 hours carried out in presence mode
DI- Lessons of 2 hours carried out in presence mode by the teacher/tutor for the entire class or a subgroup. Discussion of the topics covered in class, additional explanations, simulation of the exam

Textbook and teaching resource

1. La Biochimica di TM DEVLIN- VI ed. (2024) EDISES Università
2. Biochimica Medica- Siliprandi and Tettamanti V ed. Piccin
3. Le basi della Biochimica- Ermine Ercikan Abali III ed. Zanichelli
4. Le Basi Molecolari della Nutrizione- Arienti G V ed. Piccin

Semester

Second year, I semester

Assessment method

All students have access to a written test followed by an oral interview.
The written test consists of 27 quizzes, of which 23 single-answer and 4 multiple-choice (CLOSED ANSWER TEST). Time of one hour for the written test is assigned..
A time of one hour for the written test is assigned. The student who has passed the written test (18/30) is admitted to take the oral exam. The oral is carried out the same day, after the correction of the writing and takes about 20 minutes for each candidate. The questions proposed in the written test aim at evaluating the comprehension of the topics covered in lesson, with particular reference to the acquisition of knowledge concerning cell and organ metabolism.
In the oral examination, taking into account the written test, the student is asked to explain / deepen some of the answers provided (both those provided wrong and correct), in order to verify the correct interpretation of the question and the reasoning that led to the answer. It also evaluates the knowledge of the main metabolic pathways, and of the biochemical interactions between the cells or in the different organs / tissues and of the dysfunctions.

Office hours

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Sustainable Development Goals

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