UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

BIOCHEMISTRY

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/10 (BIOCHEMISTRY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	BIOTECHNOLOGY
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	1st semester (01/10/2021 - 14/01/2022)
ECTS	9
Lesson hours	72 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	LAVATELLI FRANCESCA (titolare) - 3 ECTS TORTI MAURO - 6 ECTS
Prerequisites	Good knowledge on General and Organic Chemistry
Learning outcomes	The aims include: the knowledge of the structure and function of the major macromolecules of biological interest with particular attention to the structural-functional relationships; the understanding of the metabolic processes and energetic pathways in the living cell and the mechanism for regulation and integration of the metabolism; the understanding of the mechanisms and signal transduction pathways for cellular communication
Course contents	Part 1. Structural and chemical features of amino acids. Peptides. Methods for analysis of protein biochemistry. Three dimensional structure of proteins. Collagens and immunogloblins. Proteins in oxygen binding and transport: myoglobin and hemoglobin. Enzymes.

	Mechanisms of catalysis. Vitamins and coenzymes. Enzyme kinetics and mechanisms of regulation. Allosteric enzymes. Monosaccharides and polysaccharides. Proteoglycans and glycoproteins. Structural lipids and storage lipids. Lipids in the biological membranes. Membrane proteins: structure and function. Part 2. Principles of bioenergetics. The role of ATP and phosphate group transfers. The importance of biological oxidations. The citric acid cycle. Oxidative phosphorylation and ATP synthesis. The chemiosmotic model. Regulation of mitochondrial function and ATP synthesis. Carbohydrate metabolism. Glycolysis. Gluconeogenesis. Glycogen metabolism. Shunt of pentose phosphate. Regulation of glucose metabolism in the liver and muscle under aerobic and anaerobic conditions.. Lipids metabolism. b-oxidation of fatty acids. The ketone bodies. Biosynthesis of fatty acid. Biosynthesis of fatty acid, triacilglicerols and phospholipids. Regulation of lipids metabolism. Amino acid catabolism. Transaminases. The urea cycle. General concepts on amino acids degradation. Hormonal regulation of fuel metabolism. insulin and glucagon. Molecular mechanisms of signal transduction.
Teaching methods	lectures in the classroom
Reccomended or required readings	Nelson DL, COX, MM : I Principi di Biochimica di Lehninger, Zanichelli; Berg JM, Tymoczko JL, Stryer L: Biochimica, Zanichelli; Campbell, Farrell: Biochimica, Edises, Bassi R, Boffi A, et al: Biochimica, Edi-Ermes
Assessment methods	Verbal exam
Further information	Verbal exam
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile