

Academic subject: Structural and Metabolic Biochemistry			
Degree Class: L-38		Degree Course: Animal Science	
		Academic Year: 2020/2021	
		Kind of class: Mandatory	Year: I Period: second semester
		ECTS: lessons: 6	
Time management, hours, in-class study hours, out-of-class study hours lesson: 60 exe/lab/tutor: 0 in-class study: 0 out-of-class study: 90			
Language: Italian		Compulsory Attendance: Yes	
Subject teacher: Elisabetta CASALINO		Tel: +390804679864 e-mail: elisabetta.casalino@uniba.it	Office: Department of Veterinary Medicine Office days and hours: Every working day, by appointment
Prerequisites: General and inorganic chemistry The student should have acquired knowledge and skills relating to the general concepts of physics, especially thermodynamics, and cytology, focusing on to the knowledge of the structure of the eukaryotic cell.			
Educational objectives: The course aims to provide students with basic knowledge of the molecular components and the main metabolic pathways of the cell, correlated with the production of energy and its use, which contribute to the metabolic function of the cell and the whole organism.			
Expected learning outcomes (according to Dublin Descriptors)		<p>Knowledge and understanding: The student will have to know structural and functional characteristics of biological macromolecules, as well as essential concepts of cellular biochemistry, with particular reference to the topics and techniques most closely related to veterinary and nutritional field, as well as good laboratory practices.</p> <p>Applying knowledge and understanding: At the end of the course, the student will be able to put the acquired knowledge in an interdisciplinary context that also allows to operate in nutrition veterinary and, more broadly, in the field of human and animal nutrition.</p> <p>Making judgements: Knowledge acquired by the student will allow future graduate to proceed autonomously, among others, in the field of animal nutrition and food technology, since he will have acquired knowledge about animal metabolism, properties of nutrients, and their transformation under different conditions.</p> <p>Communication: Knowledge of the correct scientific terminology, acquired by student during the course, will enable future graduate to use correct language in the technical-scientific context in which he will operate.</p> <p>Lifelong learning skills: Because acquisition of basics of scientific experimentation, future graduate will be able to independently approach the sources of updating relating to the subject (bioinformatics in scientific research, main databases, publications accredited nationally and internationally).</p>	
Course program			
Principles of organic chemistry: Carbon chemistry. Isomerism. Functional consequences of isomerism. Aliphatic and aromatic hydrocarbons. Functional groups: chemical characteristics and reactivity. Alcohols. Carboxylic acids. Aldehydes and Ketones. Amines. Heterocyclic compounds.			
Chemical composition of living organisms: General characteristics of biological macromolecules. Carbohydrates, Lipids, Nucleotides, Amino Acids: structural aspects. Proteins: Peptide bond and peptides, properties and functions. Primary, secondary, tertiary and quaternary structure of proteins. Hemoglobin and Myoglobin.			
Enzymes and enzymatic catalysis. Nature of enzymes. General concepts of enzymatic catalysis. Mechanism of			

enzymatic catalysis. Enzyme classification. Effectors and inhibitors of activity enzymatic. Regulation of enzymatic activity. Enzymes in food technology.

Bioenergetics and metabolism: Thermodynamics of living matter. Compounds with a high energy level. Cellular energy charge and ATP reactions. Redox reactions of biological interest. Oxidative phosphorylation: Respiratory chain. Chemiosmotic theory of oxidative phosphorylation. Biological role of inhibitors and uncouplers.

Carbohydrate metabolism in species of veterinary interest: Glycolysis. Glycogenolysis and glycogenosynthesis. Gluconeogenesis. Cori cycle. Pentose-phosphate cycle. Regulation of carbohydrate metabolism.

Citric acid cycle: The reactions of the cycle and their regulation. Anaplerotic reactions of the cycle.

Lipid metabolism in species of veterinary interest: Beta-oxidation of fatty acids. Biosynthesis of fatty acids. Synthesis of ketone bodies.

Protein metabolism in species of veterinary interest: Protein turnover. Degradation of amino acids. Elimination of protein nitrogen in different animal species. Urea cycle

Rumen biochemistry:

Rumen metabolism of polysaccharides, nitrogenous substances and lipids.

Rumen and animal metabolism: utilization of volatile fatty acids, proteins, amino acids, and lipids.

Teaching methods: The course takes place in classrooms equipped with PC, projector, and internet connection, using power point slides.

Auxiliary teaching: no safety clothing is required to attend the course.

Assessment methods: The assessment of knowledge takes place through two written intermediate tests, the first preparatory to the second, and an oral test which, together with the intermediate tests, contributes to the definition of the final exam. The student must be able, using the appropriate scientific terminology, to correlate the role of macromolecules in cellular metabolic pathways in relation to the state of the whole organism

Bibliography:

- D'Andrea G. – Biochimica Essenziale – EdiSES , 2017

- Ferrier D.R. – Le basi della biochimica – Zanichelli Editore, 2014

- Notes from the lessons

- Slides projected in the classroom (also available on the Google drive platform)