

**ACADEMIC YEAR 2022/2023**

<b>General information</b>	
Academic subject	<b>BIOCHEMISTRY 2</b>
Degree course	<b>Veterinary Biochemistry 2</b>
Academic Year	First
European Credit Transfer and Accumulation System (ECTS)	6 (Lectures:5 ECTS; practical activity:1 ECT)
Language	Italian
Academic calendar	III 7 weeks period
Attendance	Mandatory

<b>Professor/ Lecturer</b>	E-mail	Telephone
Elisabetta Casalino	elisabetta.casalino@uniba.it	+39 80 5443864
Headquarter	Campus of Veterinary Medicine, S.P. 62 per Casamassima km 3, 70010 Valenzano	
Virtual headquarter	Teams platform, cod: zitea26	
Tutoring (time and day)	Every day, from Monday to Friday, by appointment	

<b>Syllabus</b>	
<b>Learning Objectives</b>	The course aims to provide students with basic knowledge relating to the main metabolic pathways of the cell, by correlating with the production of energy and its use, which contribute to the metabolic function of the cell and the whole organism.
<b>Course prerequisites</b>	Prerequisites: Chemistry The student must also have acquired knowledge and skills relating to the general concepts of physics, especially thermodynamics, and cytology, with regard to the knowledge of the structure of the eukaryotic cell.
<b>Contents</b> <b>Teacher</b> <b>Elisabetta Casalino</b>  <b>Lectures: 5 ECTS</b>  <b>Hours: 40</b>	<p>The module refers to Basic Subjects</p> <p><b>METABOLIC BIOCHEMISTRY</b></p> <p><b>Bioenergetics and metabolism:</b> The thermodynamics of living matter. Compounds with a high energy level. Cellular energy charge and ATP reactions. Redox reactions of biological interest.</p> <p><b>Oxidative phosphorylation: The respiratory chain.</b> Chemiosmotic theory of oxidative phosphorylation. Inhibitors and decouplers of oxidative phosphorylation.</p> <p><b>Carbohydrate metabolism in species of veterinary interest:</b> Glycolysis. Glycogenolysis and glycogen synthesis. gluconeogenesis. Cori cycle. Pentose-phosphate cycle. Regulation of carbohydrate metabolism.</p> <p><b>Citric acid cycle:</b> The reactions of the cycle and their regulation. Anaplerotic reactions of the cycle.</p> <p><b>Lipid metabolism in species of veterinary interest:</b> Beta-oxidation of fatty acids. Biosynthesis of fatty acids. Synthesis of ketone bodies</p> <p><b>Protein metabolism in species of veterinary interest:</b> Protein turnover. Degradation of amino acids. Elimination of protein nitrogen. Urea cycle.</p> <p><b>FUNCTIONAL BIOCHEMISTRY</b></p> <p><b>Rumen biochemistry:</b> Rumen metabolism of polysaccharides, nitrogenous substances and lipids. Vitamins and mineral elements in rumen fermentations.</p> <p><b>Biochemistry of signalling:</b> Molecules involved in the transduction mechanism. General characteristics of signal transduction. Main types of receptors. Primary messengers. Secondary messengers.</p> <p><b>Biochemistry of oxidative stress:</b> Oxygen, reactive and radical species: Functions of radicals and ROS. Damage from radicals and ROS. Defenses against radicals and</p>

<b>Laboratory activities:</b>	ROS. The antioxidant compounds. Endogenous and exogenous antioxidants. Natural and synthetic antioxidants. Oxidative stress in veterinary medicine and animal production
<b>ECTS: 1</b>	8-10 students for each group. Preparative techniques: Cell lysis and tissue homogenization Separative techniques: Separation of blood samples by centrifugation and Percoll gradient centrifugation
<b>hours:10</b>	Analytical techniques: Spectrophotometric quantitative assay of proteins; spectrophotometric assay of enzymatic activities; Separation of nucleic acids by agarose gel electrophoresis
<b>Biosecurity standards for the frequency of laboratory activities</b>	Access to the laboratories is allowed only to students equipped with protective clothing (disposable latex gowns and gloves), who have read the biosecurity manual.
<b>Books and bibliography</b>	- Siliprandi & Tettamanti - BIOCHIMICA MEDICA. - Piccin Editore - Berg & Stryer - BIOCHIMICA - Zanichelli Editore
<b>Additional materials</b>	Books can be supplemented by lecture notes and slides projected in class (available on the google drive platform)

<b>Work schedule</b>			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b>Hours</b>			
<b>150</b>	<b>40</b>	<b>10</b>	<b>100</b>
<b>ECTS</b>			
<b>6</b>	<b>5</b>	<b>1</b>	
<b>Teaching strategy</b>	The theoretical part of the course takes place in classrooms equipped with PC, projector and internet connection, using power point slides. The practical lessons are carried out in the suitably equipped laboratory of the biochemistry section. The students, subdivided into small groups of 8-10 people and assisted by the teacher, will approach, individually or in small groups, the laboratory techniques covered by the exercise		
<b>Expected learning outcomes</b>			
<b>Knowledge and understanding on:</b>	At the end of the course the student must know: <ul style="list-style-type: none"> <li>○ the fundamental concepts of cellular biochemistry</li> <li>○ the application of biochemical laboratory techniques more closely related to the medical-veterinary field</li> </ul>		
<b>Applying knowledge and understanding on:</b>	At the end of the course the student must: <ul style="list-style-type: none"> <li>○ be able to correlate the molecular mechanisms regulating the different cellular functions, their role in physiological processes and their observable modifications in the course of pathologies</li> </ul>		
<b>Soft skills</b>	<p><i>Making informed judgments and choices</i></p> <ul style="list-style-type: none"> <li>○ The student should be able to understand how the acquired knowledge can be applied to basic research and applied to the various contexts of veterinary science: animal welfare, animal production, food inspection and hygiene.</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ The student must be able to present the acquired knowledge with the appropriate scientific terminology</li> </ul>		

	<p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ The student must also be able to autonomously approach the update sources relating to the subject in question (databases, publications accredited nationally and internationally)</li> </ul>
<b>Assessment and feedback</b>	
Methods of assessment	The assessment of knowledge takes place through an oral test on the topics of the program, and on the discussion of the reports prepared by the students at the end of each laboratory exercise
Evaluation criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> The student should be able to describe the different cellular metabolic pathways</li> <li>• <i>Applying knowledge and understanding</i> The student should be able to correlate the role of macromolecules in cellular metabolic pathways in relation to the state of the organism as a whole.</li> <li>• <i>Autonomy of judgment</i> The student should be able to autonomously organize a broad speech illustrating a certain process using all the knowledge acquired.</li> <li>• <i>Communicating knowledge and understanding</i> the student must be able to present the knowledge acquired during the course using the appropriate terminology</li> <li>• <i>Communication skills</i> The student must be able to use the appropriate scientific terminology in a clear and simple way, understandable even to those who do not have in-depth knowledge of the subject</li> <li>• <i>Capacities to continue learning</i> The student must be able to correlate the knowledge acquired by integrating and harmonizing them with the concepts previously acquired in the other related disciplines (eg: physics, chemistry ...)</li> </ul>
Criteria for assessment and attribution of the final mark	The final grade is expressed out of thirty. The exam is passed when the grade is greater than or equal to 18/30. Knowledge of all metabolic pathways is an essential requirement for passing the exam. The use of correct scientific terminology, the ability to correlate the various metabolic pathways, as well as the ability to organize a discourse by spacing and correlating the various concepts acquired, will contribute to the increase of the final grade
<b>Additional information</b>	To obtain the attendance signature and take the exam, students must attend 75% of the theoretical lessons and 75% of the exercises, unless the COVID state of emergency persists, in which case the lessons will be provided by remoto