

ACADEMIC YEAR 2023/2024

General information	
Academic subject	BIOCHEMISTRY AND MOLECULAR BIOLOGY
Integrated teaching modules	Metabolic Biochemistry; Molecular Biology.
Degree course	Veterinary Medicine (LM42)
Academic Year	I
ECTS	7 (lectures: 6 ECTS; practical activity: 1 ECTS)
Language	Italian
Academic calendar	II 7-week term
Attendance	Mandatory

Teacher	Email address	phone
Elisabetta Casalino	elisabetta.casalino@uniba.it	080 5443864
Anna Maria D'Erchia	annamaria.derchia@uniba.it	080 544 3303
Department and address	Campus of Veterinary Medicine- S.P.62 Casamassima, km 3, Valenzano	
Virtual headquarters	Biochemistry Teams platform, access code: zitea26 Molecular biology: Piattaforma Teams, access code: dcnrq1o	
Tutoring (time and day)	Prof. Casalino:, from Monday to Friday, by appointment Prof D'Erchia: to be agreed by e-mail	

Syllabus	
Learning Objectives	The integrated teaching module of Biochemistry and Molecular Biology aims to provide students with the 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 cellular metabolic functionality and the whole organism as well as knowledge of the basic contents of molecular biology and recombinant DNA techniques
Course prerequisites	Prerequisites: Physics, Chemistry and Propedeutics Biochemistry
Content of the didactic module of: Metabolic Biochemistry Teacher: Elisabetta CASALINO Lectures: 4 ECTS 32 hours	The module concerns the Basic Sciences Bioenergetics and metabolism: The thermodynamics of living matter. Compounds with a high energy level. Cellular energy charge and ATP reactions. Redox reactions of biological interest. Oxidative phosphorylation: The respiratory chain. Chemiosmotic theory of oxidative phosphorylation. Inhibitors and decouplers of oxidative phosphorylation. 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. Urea cycle. FUNCTIONAL BIOCHEMISTRY

<p>Laboratory activities: 1 ECTS 10 hours</p>	<p>Rumen biochemistry: Rumen metabolism of polysaccharides, nitrogenous substances and lipids. Vitamins and mineral elements in rumen fermentations. Biochemistry of oxidative stress: Oxygen, reactive and radical species: Functions of radicals and ROS. Damage from radicals and ROS. Defenses against radicals and ROS. The antioxidant compounds. Endogenous and exogenous antioxidants. Natural and synthetic antioxidants. Oxidative stress in veterinary medicine and animal production</p> <p>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 Analytical techniques: Spectrophotometric quantitative assay of proteins; spectrophotometric assay of enzymatic activities.</p>
<p>Content of the didactic module of: Molecular Biology</p> <p>Teacher: Anna Maria D'ERCHIA</p> <p>Lectures: 4 ECTS 32 hours</p>	<p>The module concerns Basic Sciences</p> <ul style="list-style-type: none"> - Chemical and physical structure of nucleic acids. - DNA replication in prokaryotes and eukaryotes. - Transcription and translation. - Basic Molecular Biology techniques: - Nucleic acid extraction methods; - Qualitative and quantitative analyzes of nucleic acids; - Application of electrophoresis to the study of nucleic acids; - Restriction endonuclease; - Fingerprinting; - Cloning; - PCR and Real Time PCR; - Sanger sequencing of DNA; - Microarray: principles and applications; NGS sequencing
<p>Biosecurity standards for the frequency of laboratory activities</p>	<p>Access to the laboratories is allowed only to students equipped with protective clothing (disposable latex gowns and gloves), who have read the biosecurity manual.</p>
<p>Books and bibliography</p>	<p>Metabolic Biochemistry teaching module</p> <ul style="list-style-type: none"> - Siliprandi & Tettamanti – BIOCHIMICA MEDICA – Piccin Editore - Berg & Stryer – BIOCHIMICA - Zanichelli Editore <p>Molecular Biology teaching module:</p> <ul style="list-style-type: none"> Allison - FONDAMENTI DI BIOLOGIA MOLECOLARE, Zanichelli; - Amaldi et al. - TECNICHE E METODI PER LA BIOLOGIA MOLECOLARE - Casa Editrice Ambrosiana; - Amaldi et al. – BIOLOGIA MOLECOLARE – CEA, (II ed.)
<p>Additional materials</p>	<p>Books can be supplemented by lecture notes and slides projected in class (available on the google drive and Teams platform)</p>

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
175	48	10	117

ECTS			
7	6	1	
Teaching strategy	The theoretical part of the course takes place in classrooms equipped with PC, projector and internet connection, using power point slides. The practical lessons (only Metabolic Biochemistry) 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		
Expected learning outcomes			
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ The student will have to know the fundamental concepts of cellular biochemistry, the flow of genetic information, the basic aspects of the structure and organization of genomes ○ The student will have to know the basic laboratory techniques of biochemistry and molecular biology 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ The student must 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 ○ The student must be able to integrate the knowledge learned with that relating to other teachings of the degree course, in order to acquire new skills for the study of farm and companion animals 		
Soft skills	<p><i>Making informed judgments and choices</i></p> <ul style="list-style-type: none"> ○ 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 (DOC 2.2). ○ <i>Communicating knowledge and understanding</i> the student must be able to present the acquired knowledge with the appropriate scientific terminology (DOC 1.4) <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ The student must also be able to autonomously approach the update sources relating to the subject in question (databases, publications accredited nationally and internationally) (DOC 1.8) 		
Summary of the integrated knowledge and skills that the course contributes to acquiring students (Day One Competence) envisaged by the EAEVE	Knowledges: 2.2 Skills: <ul style="list-style-type: none"> • 1.4 • 1.8 		
Assessment and feedback			
Methods of assessment	The exam of the integrated course of Metabolic Biochemistry and Molecular Biology allows the acquisition of 7 ECTS. The exam includes a partial test of the modules of "Metabolic Biochemistry" and "Molecular Biology". ECTS are considered acquired only after passing the two parts. An oral test is foreseen for both modules; as regards the Metabolic Biochemistry module, the assessment takes place through an oral exam on the topics of the program, and on the discussion of the reports prepared by the students at the end of each laboratory exercise		

<p>Evaluation criteria</p>	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ The student must be able to describe the different cellular metabolic pathways, the organization of the genome and the mechanisms that regulate the flow of genetic information <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ The student should be able to correlate the role of metabolic and genetic pathways in relation to the state of the organism as a whole. <p><i>Autonomy of judgment</i></p> <ul style="list-style-type: none"> • The student should be able to autonomously organize a broad speech illustrating a certain process using all the knowledge acquired. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ the student must be able to present the knowledge acquired during the course using the appropriate terminology <p><i>Communication skills</i></p> <ul style="list-style-type: none"> ○ 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 • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ 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 ...)
<p>Criteria for assessment and attribution of the final mark</p>	<p>The results of the partial exams of "Metabolic Biochemistry" and "Molecular Biology" will contribute to the definition of the final grade of the exam of the integrated course of "Biochemistry and Molecular Biology". The final grade, expressed out of thirty, is the result of the collective judgment relating to the 2 partial tests.</p> <p>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</p>
<p>Additional information</p>	