Clinical Molecular Biology
(2 CFU; 22 hours: 16 theory and 6 practical)

Course learning objectives: upon completion of the course, the student acquires basic theoretical knowledge related to animal genomics and proteomics. He/she knows the basic techniques of clinical molecular biology applied to: 1) study of genome function and expression; 2) electrophoretic separation of the serum proteome. The course is divided into two modules: Module I (16 hours Prof. Isani) and Module 2 (6 hours, Prof. Andreani)

Theory lessons (16 hs) (Module 1 Prof.ssa Isani)

Topics and skill acquired	Topics	Specific contents	hours
		Introduction: the language of molecular biology; genomics, transcriptomics and proteomics. Nuclear and mitochondrial genomes	**1**
1. GENOMICS (11 HOURS) *Acquisition of:* *(a) language appropriate to the "omics" disciplines.* *(b) basic knowledge of the main techniques of studying nucleic acids;* *(c) knowledge of the molecular basis of some important hereditary diseases in dogs.*		Nucleic acid extraction, Purification and electrophoretic separation	**1**
	Techniques for studying nucleic acids	Amplification techniques (PCR), Sanger sequencing, CRISPR-Cas9	**2**
	Exploring the dog genome	The mitochondrial genome and mentions of mitochondrial diseases	**1**
		The dog genome	**1**
		The importance of mutations. Molecular bases of diversity among races	**1**
		Study of molecular and biochemical factors underlying some hereditary diseases in dogs	**4**
2. POTEOMICS (5 HOURS) *Acquisition of:* *(a) basic knowledge of the main techniques of proteome separation by electrophoresis* *(b) biochemical role of major circulating proteins.*	***Techniques for separating proteomes***	Protein electrophoresis: 1D electrophoresis, with emphasis on electrophoresis used in clinical settings to separate plasma proteins. Analysis of ferograms of animals of veterinary interest	**2**
	Plasma proteins and their role	Biochemical characteristics of major circulating proteins.	**3**

Practical Activities 6 hours (Module 2 Prof.ssa Andreani)		
Topics and skill acquired	**Topics**	**Specific contents**
3. ABILITY TO PERFORM AND CRITICALLY EVALUATE (TOT 6 HOURS) *acquisition of: a) ability to correctly apply an experimental protocol; b) ability to use some laboratory instruments correctly; c) critical evaluation of the obtained results*	***DNA extraction***	DNA extraction from a biological sample; evaluation of DNA purity by reading at 260 and 280 nm.
	Perform of an absorption spectrum of a substance	Determination of the absorption spectrum of the pyridine coenzyme NADH (reduced form) and NAD (oxidized form)
	Protein quantification	Quantification of urinary proteins by TCA precipitation and turbidimetric evaluation