

Physiology 1 (6 CFU, 66 hours: 58h lectures, 8h labs, per student)			
MODULE 1: prof. BACCI Lectures		MODULE 2: dr. VENTRELLA Laboratories	
MODULE 1			
GENERAL TOPICS	TOPICS	SPECIFIC CONTENTS	HRS
INTRODUCTION (2)	ANIMALS AND ENVIRONMENT	Animals within their environment, physiological functions, behavior, homeostasis and homeorhesis, feedbacks.	2
GENERAL PHYSIOLOGY (7)	THE CELL MEMBRANES AND ITS ELECTRICAL EVENTS	The cell membrane. The cell. Structures and specialized functions.	1
		Passive transport: Diffusion, channel mediated diffusion, facilitated diffusion. Channel protein. Diffusion of water. Osmosis and osmotic pressure. Carrier proteins. Primary active transports: Sodium/Potassium ATPase pump, protonic pump, Calcium pumps, etc.	2
		Secondary active transports, symporter and antiporter. Glucose and amino-acids intestinal absorption, protonic pump, HCl gastric production. Endocytosis, exocytosis, phagocytosis, pinocytosis.	2
		Nernst's and Goldman's equations; resting membrane potential.	2
BLOOD (8)	CELLS AND CORPUSCLES	General blood principles. Erythrocytes: structure, metabolism and functions. Hematocrit. Erythropoiesis, erythrocytosis. Hemoglobin: structure, metabolism and functions. Avian species differences.	2
		Leukocytes: structure, metabolism and functions. WBCs differential count. Platelets. Leukopoiesis. Avian species differences.	2
	PLASMA	Plasma composition. Blood buffer systems. Plasmatic proteins: production and functions. Oncotic pressure.	2
	HEMOSTASIS AND BLOOD TYPES	Hemostasis. Coagulation: intrinsic and extrinsic pathways. Blood types.	2
GENERAL PHYSIOLOGY: CELLS AND MEMBRANES (12)	CELL SIGNALING AND SYNAPSES	Cell signaling. Endocrine, paracrine and autocrine signaling. Slow and fast signaling chemical messengers. Second messengers: AMPc and Ca ⁺⁺ . Synaptic signaling.	2
		Glial cells and functions. Neurons types. Membrane electrical events. Membrane threshold potential. Graded membrane potentials and its characteristics. Action potential. Absolute and relative refractory periods and their consequences.	2
		The role of Ca in action potentials in non-nervous tissues. Origin of the action potential. Differential distribution within classic neurons of voltage-dependent and ligand-gated ion channels. Electrical event propagation in myelinated and non-myelinated fibers; saltatory conduction. Conduction paces.	2
		Synapses categories: cytoneural and interneuronal, electrical and chemical, excitatory and inhibitory. Divergence and convergence in signaling.	2
		An excitatory chemical synapse: the neuro-muscular junction. Post-synaptic excitatory and inhibitory potentials. Ionotropic and metabotropic receptors. Spatial and temporal summations. Pre-synaptic inhibition and facilitations. Peculiarities of the synaptic transmission.	2
		Nervous system chemical mediators: synthesis, actions and elimination. Agonists and antagonists.	2
PHYSIOLOGY OF THE GASTROINTESTINAL SYSTEM (17 ORE)	SALIVARY AND GASTRIC SECRETION; CONTROL MECHANISM OF DIGESTION AND ABSORPTION OF PROTEINS, CARBOHYDRATES AND LIPIDS; RUMINANTS	Functions of the gastrointestinal system: motility, secretion, absorption. Differences between carnivores, omnivores and cranial/caudal herbivores. Types of digestion: mechanical, chemical, enzymatic and fermentative. Regulation of digestive functions: hormonal and nervous controls. Digestions phases: cephalic, gastric and intestinal. Hunger and appetite, short- and long-term control. Food prehension and drinking. Mastication. Salivation and its control. Conditioned and unconditioned reflex. Deglutition and its control. Esophageal movements and their control. Stomach functions: secretory activity. Development of secretions in time.	5
		Gastric motility, modalities and functions. Gastric emptying timing. Gastrointestinal hormones, orexigenic and anorexigenic. Vomiting: reflex center, chemoreceptor trigger zone and integrative center.	3
		Exocrine pancreatic function and secretion control; hepatic functions, bile functions.	3
		Intestinal functions: secretion, re-absorption and motility (Enteric Nervous System and peristaltic reflex), and their control.	2
		Pre-stomach functions: motility and its control; Urea cycle; Volatile Fatty Acids metabolism.	4
PHYSIOLOGY OF THE CENTRAL AND PERIPHERAL NERVOUS SYSTEM (12)	GENERAL AND SPECIAL SENSITIVITY	Sensory receptor cells. Categorizations of sensory receptors. The receptor potentials. The transmission of signals. Characteristics of the different sensory receptors. The conscious and unconscious sensory perception.	2
		Special sensitivity, proprioceptive, tactile, pain and thermal. Proprioception: Golgi tendon organ and muscle spindle.	2
	SPINAL CORD FUNCTIONS	Spinal cord organization, meninges, cerebrospinal fluid. Ascending tracts.	2
		Descending tracts. Spinal and complex reflexes.	2
	ENCEPHALIC AND SUBENCEPHALIC FUNCTIONS	Functions of the encephalic trunk. Hypothalamic functions. Cerebellar functions. Thalamus and cortex functions.	2
		Autonomic Nervous System: general organizations, chemical mediators and receptors. Pre- and post-ganglionic neurons, characteristics and peculiarities. Adrenal medulla. Effectors of the autonomic nervous system and effects of the 2 branches.	2