



FONDAMENTI DI FISILOGIA GENERALE

BIO/09 - 6 CFU - 2° Semester

Teaching Staff

VENERA CARDILE

Email: cardile@unict.it

Office: Dipartimento di Scienze Biomediche e Biotecnologiche, Torre Biologica, Via Santa Sofia
97-95123 Catania

Phone: 0954781318

Office Hours: martedì e mercoledì 10-12

LEARNING OBJECTIVES

The course allows the student to acquire the knowledge about the vital functions of man and the cellular mechanisms of the major biological systems. It analyzes the integrated functioning of the different organs and systems of control by which the living organism obtains and maintains the homeostasis inside.

COURSE STRUCTURE

During the course of the lessons there will be written tests and oral interviews in the appeals indicated in the exam calendar. About it, the student will receive a pdf of some topics covered in class.

DETAILED COURSE CONTENT

Cell membranes

Composition, organization, structural asymmetries - Intercellular junctions.

Exchanges between cells and the environment

Simple diffusion through membranes - Diffusion through channels: channel selectivity, leakage channels ("always" open) and gated channels (equipped with "ports"), water channels (aquaporins) - Mediated transports: membrane carriers, facilitated diffusion, primary and secondary active transports - Movement of water through the membranes: osmosis - Vesicular transports: phagocytosis, pinocytosis, exocytosis - Exchanges through epithelia.

Ionic flows and electrical effects

Ionic equilibria - Diffusion potential and equilibrium potential - Electrical properties of membranes - Genesis of membrane potential.

Excitable cells

Characteristics of the action potential: refractoriness, accommodation - Signal conduction along nerve fibers: velocity, myelination - Electrical properties of the myocardial fibers of pacemaker fibers and non-specific ones - Skeletal and smooth muscle fibers: electrical, mechanical and metabolic aspects of contraction - Ca²⁺ ions in muscle contraction.

Communication between cells

Mechanisms, modulation and control of endocrine communication: hormones, receptors, second messengers - Synaptic communication: electrical and chemical synapses, pre- and post-synaptic mechanisms, neurotransmitters and neuromodulators, space-time summation, plasticity (LTP and LTD) - Synapse neuro -Muscle.

Coding of sensory information

Receptor complexes: classifications, definition of stimulus, threshold and receptive field - Mechanisms of transduction and coding - Receptor sensibility - Spinal reflexes.

Control of vegetative functions

Nervous system organization - Integrated programs: hypothalamic functions.

Cardio-circulatory system

Blood: composition, functions, gas transport, hematopoiesis.

Hemodynamics (velocity, pressure, resistance, flow regimes) - Functions of the arteries: elastic properties, arterial pulse - District and systemic control of peripheral resistance - Capillary exchanges - Venous return

Cardiac function: automatism, mechanical and electrical properties, intrinsic and extrinsic regulation.

Ventilation

Ventilation in aquatic and terrestrial environments - Mechanical aspects of pulmonary ventilation: dead spaces, respiratory volumes, intrapleural and alveolar pressure, compliance, surface tension - Alveolus-capillary diffusion - Control of ventilation: bulbo-pontine centers, intrinsic rhythm, chemical and mechanical regulation .

Internal environment regulation

Renal mechanisms: filtration, reabsorption, secretion - Excretion of metabolic waste - Water balance: concentration of urine - Control of volume, osmolarity and acid-base balance of body solutions.

Digestion

Digestive system: motility, secretions and absorption - Exocrine pancreas - Role of bile - Nervous and chemical control of gastrointestinal functions.

TEXTBOOK INFORMATION

D.U. Silverthorn, Fisiologia umana, Casa Editrice Ambrosiana;

R. Hill, G. Wyse, M. Anderson, Fisiologia animale, Zanichelli;

D. Schimdt-Nielsen, Fisiologia animale, Piccin.
