

SCIENZE MORFOFUNZIONALI (APU003)

1. language

Italian.

2. course contents

Coordinator: Prof. FABIOLA PACIELLO

Year Course: 1st

Semester: 1st

UFC: 5

Modules and lecturers:

- ANATOMIA UMANA (APU039) - 2 ufc - ssd BIO/16

Prof. Valentina Corvino

- FISIOLOGIA UMANA (APU041) - 2 ufc - ssd BIO/09

Prof. Fabiola Paciello

- ISTOLOGIA (APU040) - 1 ufc - ssd BIO/17

Prof. Ilaria Marrocco

3. BIBLIOGRAPHY

Human Anatomy: "Anatomia Umana", Martini et al., Ed. EdiSES.

Histology: "Istologia", Junqueira et al., Ed. Piccin.

Human Physiology: "Fisiologia", Stanfield, Ed. Edises; "Fisiologia Umana -Elementi-", Bossi et al., Ed: Edi-ermes.

In the presence of multiple texts for a single module, it is up to the student to choose a reference text from the recommended ones. Additional materials will also be provided.

4. LEARNING OBJECTIVES

The whole course aims to achieve the following objectives: to provide the knowledge to recognize and describe the main tissues and anatomical structures of the human body and to understand the functional significance of each observed morphological aspect; to understand the primary functions of various organs and systems of the human body and to comprehend the mechanisms underlying processing of nervous, sensory, and auditory information.

At the end of the course, students should demonstrate that they have achieved the following objectives:

Knowledge and understanding abilities- *To demonstrate the ability to recognize and describe human tissues and anatomical structures and to understand the neurophysiology underlying mechanisms regulating the processing of nervous, sensory, and auditory information.*

Applying knowledge and understanding- *To have acquired the knowledge of the morphological and anatomical aspects of the organism and the ability to adequately understand the processing of sensory signals, with a specific focus on the auditory system, essential in the processing of sounds and language.*

Making judgements- *Begin able to integrate knowledge and skills acquired, and ultimately,*

upon completion of the studies, being able to work independently, following a diagnosis and prescription from a specialist physician.

Communication skills– *Knowing how to communicate clearly and unambiguously, using the appropriate scientific language, with both specialist and non-specialist interlocutors.*

Learning skills – *Being able to update and expand knowledge autonomously by consulting texts, scientific articles, online platforms, and databases (NCBI, Ensemble, UniProt, PDB, etc.). Gradually acquiring the ability to attend specialized seminars, conferences, masterclasses, etc.*

5. prerequisites

The basic educational background and knowledge of chemistry, physics, and mathematics are required.

6. TEACHING METHODS

The teaching methodology is based on frontal lessons providing the basic elements of various disciplines, with a particular focus on the auditory system. During the lessons, in addition to standard teaching methods, students will be actively involved to enhance their communicative skills. According to the provisions of the educational program since August 1, 2021, classes, compatible with the health situation, will be conducted in person with simultaneous live streaming for the benefit of students who are unable to participate in on-site educational activities. Teachers will conduct their lessons from university classrooms, adhering to safety measures. The lessons will be recorded and made available to enrolled students for at least one week, with the option to view but not to download them.

7. OTHER INFORMATIONS

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8. METHODS FOR VERIFYING LEARNING AND FOR EVALUATION

Final oral examination with the possibility of interim assessments. Specifically, for the Human Anatomy module, a mid-course assessment (heart and respiratory system) is scheduled, which will account for 1/3 of the module grade; the interim assessment will be valid until the end of the year. The final exam will focus on the content of the course modules. The examination board will evaluate the student's preparation with targeted questions to assess the acquisition of: judgment autonomy on the topics covered, learning ability, and communicative skills in expressing one's knowledge.

A score will be assigned to the student based on the weighted average of the results obtained in each module. A student who answers all questions from all modules of the course may achieve the maximum score (grade: 30/30 with honors).

9. program

Human Anatomy

- *Anatomical nomenclature, reference planes.*
- *Musculoskeletal System. Neurocranium, splanchnocranium. Vertebral column. Bones of the thorax, upper limb, and lower limb. Overview of the classification and characteristics of joints. General information on muscles of the head, trunk, and limbs.*
- *Cardiovascular System. Definition of the mediastinum. Heart: topography, external and internal conformation, structure, conduction system. Systemic and pulmonary circulation. Aorta and its main branches. Major venous vessels.*

- *Lymphatic System. Lymphatic vessels. Lymphatic organs: lymph nodes, spleen, thymus, tonsils.*
- *Respiratory System. Topography, external and internal conformation of: nose, larynx, trachea, bronchi, lungs. Respiratory muscles. Pleura.*
- *Auditory System. External ear: auricle, external acoustic meatus. Middle ear: tympanic cavity and membrane, ossicles of the ear, mastoid cavities, auditory tube. Inner ear: bony labyrinth, membranous labyrinth.*
- *Central Nervous System. General organization of: spinal cord, brainstem, hypothalamus, thalamus, cerebellum, cerebrum. Motor pathways. Sensory pathways.*
- *Peripheral Nervous System. General organization. Cranial nerves; auditory and vestibular pathways.*
- *Autonomic Nervous System. General organization.*
- *Digestive System. Overview: topography, oral cavity, pharynx, esophagus, stomach, small intestine, large intestine. Liver and pancreas.*
- *Urinary System. Overview: relationships, external and internal conformation of the kidneys, ureters, bladder, urethra.*
- *Endocrine Glands. Pituitary gland.*

Histology

- *Definition and classification of tissues.*
- *Epithelial tissue. Overview. Covering epithelia: classification and description of various types of epithelium; cytological features; specializations of the apical, lateral, and basal domains; anatomical distribution. Glandular epithelia: general characteristics and classification of exocrine glands.*
- *Connective tissues. Overview. Cellular components and extracellular matrix (fibers and ground substance). Proper connective tissue: loose connective tissue and dense connective tissue, regular and irregular (general characteristics and distribution, cytological elements and extracellular matrix). Specialized connective tissues: adipose tissue (general characteristics and distribution, cytological elements and extracellular matrix); cartilage and bone tissue (general characteristics and distribution, cytological elements and matrix, types of cartilage, structural organization of lamellar and non-lamellar bone, microscopic structure of compact and spongy bone); blood and hematopoietic tissue (hemopoiesis, cellular components, plasma composition).*
- *Muscle tissue: overview and classification. Skeletal striated muscle tissue: structural and ultrastructural features of skeletal striated muscle fiber (myofibrils and myofilaments), sarcomere. Cardiac striated muscle tissue: structural and ultrastructural features of cardiac striated muscle fiber. Smooth muscle tissue: structural and ultrastructural features of smooth muscle cell.*
- *Nervous tissue. Overview. Cellular elements: the neuron (cell body, dendrites, and axon) and neuroglia. Axonal transport. Myelinated sheath. Nerve fiber. Synapse and synaptic transmission. Neurotransmitters. Nerve impulse.*
- *Histology of the ear. Characteristics and organization of the external, middle, and inner ear. Specialized sensory cells of the membranous labyrinth. Vestibuloacoustic system."*

Human Physiology

- *Physiology of excitable cells. Cell membrane: structure and permeability.*

Transport of water and solutes across the membrane.

Ion channels and electrogenesis.

Resting membrane potential.

Passive propagation of electrical signals.

Generation and propagation of action potential.

Synapse: electrical and chemical synapses. Neurotransmitters and receptors. Excitatory and inhibitory postsynaptic potentials; spatial and temporal summation.

Synaptic plasticity.

Functions of glia.

- *Muscular system:*

Functional characteristics of skeletal and smooth muscle.

Structural and molecular basis of muscle contraction.

Skeletal muscle: excitability, neuromuscular transmission, end-plate potential, and action potential. Excitation-contraction coupling in skeletal muscle. Motor units.

Smooth muscle: structure, regulation, and control of contraction.

- *Cardiovascular system:*

Characteristics of myocardial cells, cardiac electrical activity, resting and action potentials, ECG recording. Origin of the heartbeat. Conduction system. Mechanical events of the cardiac cycle. Cardiac tones. Blood circulation. Arterial pressure. Capillary exchanges and venous return.

- *Neurophysiology.*

Organization of the cerebral cortex: sensory, motor, and associative areas.

Principles of sensory physiology: transduction and encoding.

Somatic senses. Processing and perception of sensory information.

Autonomic nervous system.

Auditory system: cochlear mechanics and central auditory pathways.

Vestibular system.