

Degree Course of Physiotherapy

INTEGRATED COURSE: ANATOMY, HISTOLOGY AND HUMAN PHYSIOLOGY

CFU: 6

SSD: BIO/9, BIO/16, BIO/17

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MODULE HUMAN ANATOMY

CFU: 3

SSD: BIO/16

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MODULE PHYSIOLOGY

CFU: 2

SSD: BIO/09

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MODULE HYSTOLOGY

CFU: 1

SSD: BIO/17

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PREREQUISITES

Although there are no prerequisites, minimum basic knowledge of cell biology, histology and cytology is required, in order to optimize learning and the achievement of specific objectives. This makes the content of the teaching more comprehensible.

LEARNING OBJECTIVES

HUMAN ANATOMY

At the end of the course the student must be able to: Describe the macroscopic organization of the human body using the appropriate terminology appropriately. Describe the main cavities of the body, describe the individual organs of the various apparatuses and systems from the macroscopic, microscopic and topographic point of view.

PHYSIOLOGY

The course is aimed at giving the student a sound understanding of the functions of the various organs and systems of the human body and the mechanisms underlying these functions. The course also aims to provide knowledge on the functional integration of the various systems and on their regulation in physiological conditions also for the purpose of maintaining homeostasis.

HYSTOLOGY

The course aims to provide student with the skills necessary for the full understanding of the most important tissues of the human organism. The student must be able to acquire a correct terminology and develop skills of interpretation and application that the graduate in physiotherapy will have to use in the planning and management of work activities.

LEARNING OUTCOMES

HUMAN ANATOMY

Knowledge and understanding

At the end of the course the student is required to know

- basic terminology of human anatomy
- basic organization of human anatomical structures (LOCOMOTOR SYSTEM, CARDIO-SPLANCHNOLOGY)
- basic organization of neuroanatomical structures
- the identification of specific component of the anatomical regions and their functional and physical interaction

Applying knowledge and understanding

At the end of the course the student will be able to:

Use the knowledge of human anatomy and neuroanatomy to better understand the human physiology and physiopathology, necessary knowledge equipment for professionals in the field of human health. The student will also use the knowledge collected to further study some specific topics required by its profession.

Communication skills

At the end of the course the student must know adequately the human anatomical structures and be able to use the specific anatomical terminology so as to be able to relate, within the care process, with patients of all ages and/or with other health professionals, in an appropriate verbal, non-verbal and written form.

Making judgements

The knowledge of human anatomy will help the student to develop a critical thinking in the ability to decide priorities and needs in response in relation to the complexity of the rehabilitation intervention.

PHYSIOLOGY

At the end of the course the student is supposed:

Knowledge and understanding abilities

- To have acquired the knowledge and understanding of bodily functions, the molecular and cellular mechanisms underlying the functioning of the various organs and systems and the main processes of integration, regulation and homeostatic control.

Applied knowledge and understanding skills

- To demonstrate the understanding of the clinical relevance of the acquired knowledge with reference to implications in diagnosis and treatment of the different diseases.

Communication skills:

The student should be able to describe and communicate the acquired scientific knowledge and applied know-how, in a clear and unambiguous way using an appropriate terminology.

Making Judgements:

At the end of the course the student should be able to make self-evaluation of his/her knowledge and develop critical thinking integrating the knowledge and the skills learned.

HYSTOLOGY

Knowledge and understanding

At the end of the course the student should have acquired:

- The knowledge of the structures of the various tissues that compose the human organism
- The knowledge of the histological organization of the various human organs
- The ability to identify the morphology of the tissues, the cells that compose them, from a morphological and functional point of view
- The ability to synthesize and correlate the various topics.

Applying knowledge and understanding

At the end of the course the student should have acquired:

- The ability to apply the histology knowledge to understand other closely related branches of biology such as anatomy, cytology, physiology.

Communication skills

At the end of the course the student should:

- Use correct scientific terminology to identify, at a microscopic level, the different types of cells and tissues present in the human organism.

Making judgements

At the end of the course the student should:

- Carry out rough assessments of the topics covered.

COURSE SYLLABUS

HUMAN ANATOMY

LOCOMOTOR SYSTEM. (11hs) Skeleton: skull, vertebral column and main bones of the trunk, superior limb, inferior limb, pectoral and girdle and pelvis. Joints structure and classification, movements. Joints: Temporo-mandibular joint, shoulder joint, intervertebral joints, sterno-clavicular joint, elbow joint, radioulnar joints, wrist and hand joints. Hip joint,

joint of the knee, ankle. Muscular system. Axial musculature: main muscles of the head and neck, tongue, muscle of the pharynx of vertebral column, diaphragm, muscles of the perineum and pelvic diaphragm. Appendicular musculature: muscle of the pectoral girdle and upper limb, muscles that move the humerus, muscles that move the elbow, pronators and supinators. Muscles of the pelvic girdle and lower limbs: muscles that move the thigh and leg.

CARDIOVASCULAR SYSTEM (4hs). Heart, thoracic aorta, aortic arch, abdominal aorta. The Willis's polygon. Coronary circulation. Main arteries of superior and inferior limbs. Venous system. Superior vena cava, inferior vena cava and their main branches in the thorax and abdomen. Main veins of the superior and inferior limbs. Portal circulation. Foetal circulation. Generalities on the lymphatic system.

SPLANCHNOLOGY (9hs). Systemic and microscopy anatomy of digestive, respiratory, urinary, reproductive and endocrine Systems.

NEUROANATOMY (6hs). Spinal cord: segmental and internal organization: gray matter, ascending and descending tracts. Spinal nerves, plexuses and reflex arcs. Brainstem (Medulla oblongata, Pons, Mesencephalon): internal and external structure. Cranial nerves: nuclei and innervation. Diencephalon (Thalamus, Hypothalamus, Epithalamus): internal and external structure. Thalamic nuclei. Telencephalon: internal and external structure. Anatomical and functional organization of cerebral cortex. Allocortex. Basal Ganglia. Cerebellum: internal and external structure. Ventricular system. Meninges. Brain blood vessels and dural sinuses. Sensory system: spinothalamic, tactile, fasciculus gracilis and fasciculus cuneatus tracts, spinocerebellar tracts. Pain conduction. Visual, auditory, gustatory, olfactory and limbic system. Motor system: pyramidal and extrapyramidal tracts. Motor nuclei. Autonomic nervous system: sympathetic and parasympathetic system. Enteric nervous system.

PHYSIOLOGY

Introduction to physiology and homeostasis concepts.

Cellular physiology:

- Transport of solutes and water across the cell membrane.
- Resting membrane potential.
- Genesis and propagation of action potential.
- Synaptic transmission.

Muscle Physiology:

- Functional properties of skeletal, smooth and cardiac muscle
- Excitation and contraction of skeletal muscle.
- Neuromuscular junction and excitation-contraction coupling.
- Motor unit.

Nervous System:

-Functional organization of central and peripheral nervous system. Overview of autonomic nervous system.

Functional organization of sensory systems. Coding and processing of sensory information.

-The motor system: organization of movement: reflexes, voluntary and automatic movements; posture and balance. Control of voluntary movements. The cerebellum: general features and functions. The basal ganglia: organization and functional role.

Cardiovascular system:

- Organization of Cardiovascular system.
- Cardiac electrophysiology: pacemaker activity and specialized conductive system of the heart.
- The cardiac muscle and cardiac cycle.
- Cardiac output: principles of regulation of cardiac output.
- Hemodynamics: blood flow, pressure, vascular resistance and their regulation.
- Microcirculation: capillary exchange of solutes and water.

The Respiratory System:

- Organization of respiratory system.
- Mechanics of ventilation.
- Gas exchange in the lungs: diffusion of O₂ and CO₂ across the respiratory membrane.
- Transport of O₂ and CO₂ in blood and body fluids.
- Regulation of breathing: general principles.
- Regulation of acid-base balance: general principles.

The urinary system:

- Functional organization of the urinary system.
- Function of the nephron. Glomerular filtration: general principles. Elaboration of glomerular filtrate: resorption and tubular secretion.
- Homeostatic functions of the kidney. Control of osmolality and volume of extracellular fluid: general principles.

An overview of digestive system. Functional organization of the digestive system. General principles of digestion and absorption of nutrients

- An overview of the endocrine system. Definition and classification of hormones. General characteristics of the endocrine glands and the function of their hormones.

HISTOLOGY

Preparation of tissues for histological analysis

Microscopy, preservation of biological structures, stainings.

Epithelial tissues

Classification of epithelia, polarity of epithelial cells, junctions, absorbent epithelia, glandular epithelia.

Connective tissues

Connective tissue proper: extracellular matrix and connective cells. The different types of connective tissue proper. Adipose tissue. Blood and hematopoietic tissues. Supportive connective: cartilage and bone.

Muscle tissue

Skeletal muscle: structure of muscle fibers, contraction mechanism, diversity of muscle fibers. Cardiac muscle: structure of cardiomyocytes and myocardial conduction mechanism. The smooth muscle.

Nervous tissue

The neuron. Glial cells. Myelinated and unmyelinated nerve fibers. General structure of the nerves.

COURSE STRUCTURE

HUMAN ANATOMY

The course is taught by lectures (30 hours) and theoretical/practical exercises. During lectures, explanation of human anatomy will be performed by projecting images (Power-Point) and using Anatomical 3D Real-time Viewer tools (Complete anatomy tools) and anatomical modelling. During exercises, students will use anatomical modelling reproducing organs and anatomical system in a fully equipped exercitation room.

PHYSIOLOGY

20 Hours of frontal lessons

HISTOLOGY

The Histology course is structured in 10 hours of frontal teaching (divided into lessons of 2 or 4 hours according to the academic calendar) during which the Professor uses Power Point presentations and uses images of histological preparations obtained with an optical microscope and electronic and audiovisual media.

COURSE GRADE DETERMINATION

The examination of the Integrated Course of Anatomy and Physiology consists of an examination of the modules of Human Anatomy, Physiology and Histology whose grades contributes to the final score in proportion to the credits. The exam consists of a written test and an oral exam that must be passed on the same day. Only students who reach the minimum score of 18/30 in the written test are admitted to the oral exam. The written test consists of 60 questions that will include the topics of all the subjects of the integrated course, weighted on the number of educational credits (30 questions of Anatomy / Neuroanatomy, 20 questions of Physiology, 10 questions of Histology). All the contents in syllabus are subject to evaluation. In evaluating the written test, the teachers reserve the right to assign penalties to questions with incorrect answers, for a maximum of 0.5 points per answer. During the oral exam, the examining commission will assess the student's ability to learn as well as the ability to apply knowledge. Will also be assessed: autonomy of judgment and communication skills. The final grade will be assigned by the Commission, collectively.

PHYSIOLOGY

PHYSIOLOGY EXAM is composed by written and oral examinations. The written exam is based on a multiple-choice questionnaire. The score obtained will constitute 2/3 of the final grade for the module. The final evaluation consists of an oral exam. Students will be admitted to the oral exam if they achieve the minimum score of 18/30 in the written test.

HISTOLOGY

The acquisition of the expected learning results is ascertained through the exam. The exam will be done in written form and will consist of about 30 multiple choice questions, for each correct answer a point will be awarded. The final score of the written test will be given by the sum of the partial scores assigned to each question answered correctly.

All the contents of the course are subject to evaluation.

The evaluation includes the identification of the achievement of the objectives set and in particular for each topic will be evaluated:

- the level of acquisition of knowledge of the topics covered
- the ability to synthesize and correlate the various topics.

OPTIONAL ACTIVITIES

HUMAN ANATOMY

Students will have opportunity to conduct theoretical/practical exercises and to attend seminars. Professors will provide constant support during and after the lessons.

PHYSIOLOGY

In addition to the didactic activity, the student will be given the opportunity to participate in seminars, research internships, department internships and monographic courses. The topics of the activities are not subject to examination. Acquisition of the hours allocated occurs only with a mandatory frequency of 100% and suitability is provided.

HISTOLOGY

In addition to the didactic activity, the student will be given the opportunity to take advantage of tutoring activities upon request.

READING MATERIALS

HUMAN ANATOMY AND PHYSIOLOGY

- 1) Martini Nath: Anatomy & Physiology
- 3) Tortora, Principles of Anatomy and Physiology

Students are **STRONGLY** encouraged to use a Human Anatomy Atlas

HISTOLOGY

- 1) "Bloom and Fawcett's Concise Histology", Don W. Fawcett, Ronald P. Jensch, William Bloom – 2nd Edition - Hodder Arnold.