

Degree in Nursing

Teaching: Anatomy and Physiology

SSD: BIO/09, BIO/16, BIO/17

CFU: 6

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MODULE: Human Anatomy

SSD: BIO/16

CFU: 3

Lecturer: Giuseppe Sciamanna e-mail: giuseppe.sciamanna@unicamillus.org

MODULE: Physiology

SSD: BIO/09

CFU: 2

Lecturer: Maria Vittoria Podda email: mariavittoria.podda@unicamillus.org

MODULE: Histology

SSD: BIO/17

CFU: 1

Lecturer: Micol Massimiani e-mail: micol.massimiani@unicamillus.org

PREREQUISITES

Mandatory preparatory knowledges are not required, however basic knowledge about chemistry, physics, biology and cytology are necessary.

LEARNING OBJECTIVES

Aim of the teaching is: to describe the macroscopic organization of the human body using the appropriate terminology. 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; to provide students with knowledge on 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. 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 should acquire correct terminology and develop those skills of interpretation and application that, the graduate in nursing, will then have to use in the planning and management of work activities.

LEARNING OUTCOMES

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
- the anatomical and functional organization of the apparatuses and systems that make up the human organism
- the anatomical and functional organization of the main control systems regulating the functions of the organs and apparatuses and their mechanisms of action
- how to interpret mechanisms and anatomical-physiological phenomena
- the structures of the various tissues that compose the human organism
- the histological organization of the various human organs
- how to identify tissues and the cells that compose them, from a morphological and functional point of view
- 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
- the principles underlying measurements of physiological parameters such as blood pressure, electrical activity of the heart and respiratory parameters
- how to synthesize and correlate the various topics.

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.

Use the knowledge of physiology to understand the mechanisms underlying the maintenance of homeostasis and foresee the potential consequences of alterations affecting these mechanisms. To apply the histology knowledge to understand other closely related branches of biology such as anatomy, cytology, physiology.

The students will also use the knowledge collected to further study some specific topics required by their profession.

Communication skills

At the end of the course the student must know adequately the anatomical structures and functions of human body and be able to use the specific 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 forms. Use correct scientific terminology to identify the microscopic and macroscopic characteristics of the organs and to describe the physiological processes underlying their functioning. Use correct scientific terminology to identify, at a microscopic level, the different types of cells and tissues present in the human organism.

Making judgements

The knowledge of anatomy, physiology and histology will help the student in nursing to develop a critical thinking in the ability to decide priorities in response to the needs of nursing care in relation to the different levels of care complexity.

COURSE SYLLABUS

HUMAN ANATOMY

LOCOMOTOR SYSTEM. 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. Skeletal Muscular System: masticatory muscles (masseter, temporal, pterygoid). Motor muscles of the humerus (rotator cuff muscles, deltoid, teres major, pectoralis major, latissimus dorsi, brachial, coracobrachial), flexor and extensor muscles of the elbow (biceps brachialis, brachioradialis, triceps brachialis, anconus). Respiratory muscles (diaphragm, intercostal muscles, sternocleidomastoid, serratus posterior and anterior muscles, pectoralis minor, scalene, quadratus lumborum, external / internal oblique muscle, transversus abdominus, rectus of the abdomen).

CARDIOVASCULAR SYSTEM. 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. Systemic and microscopy anatomy of digestive, respiratory, urinary, reproductive and endocrine Systems.

NEUROANATOMY. 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. ECG. The cardiac muscle and cardiac cycle. Cardiac output and its regulation. Hemodynamics: blood flow, pressure, vascular resistance and their regulation. Principles of blood pressure measurement. 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** and **ENDOCRINE SYSTEM**. Functional organization of the digestive system. General principles of digestion and absorption of nutrients. 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

The module of **Human Anatomy** is taught by lectures (42 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. The module of **Physiology** is organized into lectures (28 hours divided into lessons of 2 or 4 hours according to the academic calendar). The lessons are supported by visual aids (slides, animated movies, etc.) that stimulate the interest of learners and help the teachers to explain the concepts easily. The module of **Histology** is structured in 14 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

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.

The examination of the teaching of Anatomy and Physiology consists of an examination of the module of Human Anatomy, Physiology and Histology whose marks are an integral part of the evaluation of the

examination of the teaching. In the context of teaching, the student's grade in each module contributes to the final score proportionally to the credits.

The knowledge and ability to understand, the ability to apply knowledge and understanding, the autonomy of judgment and the communication skills of the student will weigh in the final score as follows 30%, 30%, 30% and 10%, respectively.

HUMAN ANATOMY EXAM: The assessment of learning takes place on the basis of a written test consisting of open and closed multiple choice answers, and eventually by an oral exam. For each written test, different grades are assigned to the answers depending on the difficulty of the question and according to the answers given (complete or partial) for a maximum of 25 points. In some cases, if the answer is clearly wrong, 0.5 points can be deducted from the final grade. Students who reach the minimum score of 18/30 in the written test may request to be admitted to the oral exam. At the oral exam the student can be assigned 8 points, which will be added to that of the written test score, for a maximum of 30/30 cum laude (33/30). During the oral exam can be deducted from the written test grade, up to 8 points.

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 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.

OPTIONAL ACTIVITIES

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

READING MATERIALS

- Martini, Timmons, Tallitsch: Human Anatomy,
- Tortora: Human Anatomy,
- Martini Nath: Anatomy & Physiology
- Berne & Levy "Physiology", 7th Edition
- Sherwood, "Human Physiology: From cells to Systems" ninth edition.
- Guyton-Hall Textbook of Medical Physiology, 14th Edition
- "Bloom and Fawcett's Concise Histology", Don W. Fawcett, Ronald P. Jensch, William Bloom – 2nd Edition - Hodder Arnold.

Students are encouraged to use an Human Anatomy Atlas.