



## **BSc Degree in Nursing**

**INTEGRATED COURSE:** ANATOMY AND PHISIOLOGY

**NUMBER OF CFU:** 6

**SSD:** BIOS-06/A, BIOS-12/A, BIOS-13/A

**RESPONSIBLE PROFESSOR:** LOZANOSKA OCHSER BILIANA

**E-MAIL:** biliana.lozanoskaochser@unicamillus.org

MODULE: HUMAN ANATOMY

NUMBER OF CFU: 3

SSD: BIOS-12/A

PROFESSOR: RASHID ANAS

e-mail: anas.rashid@unicamillus.org

Office hours (by appointment): Monday from 3 pm to 4 pm

MODULE: PHYSIOLOGY

NUMBER OF CFU: 2

SSD: BIOS-06/A

PROFESSOR: ANASTASI FRANCESCA

e-mail: francesca.anastasi@unicamillus.org

Office hours (by appointment): Monday from 3 pm to 4 pm

MODULE: HISTOLOGY

NUMBER OF CFU: 1

SSD: BIOS-13/A

PROFESSOR: LOZANOSKA OCHSER BILIANA

e-mail: biliana.lozanoskaochser@unicamillus.org

Office hours (by appointment): Monday from 3 pm to 4 pm

### **PREREQUISITES**

Basic knowledge of chemistry, physics, biology and cytology .

### **LEARNING OBJECTIVES**

At the end of this course, the students will be able to describe:

- the macroscopic organization of the human body using the appropriate terminology ;

- the main cavities of the body, and the individual organs of the various apparatuses and systems from a macroscopic, microscopic and topographic point of view;
- the functions of the various organs and systems of the human body and the mechanisms underlying these functions.
- the principal tissues of the human body and their functions
- the functional integration of the various systems and their regulation in physiological conditions to maintain homeostasis.

Beyond the above milestones, the course aims to provide the students with the ability to interpret and apply the acquired knowledge 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.

### **Applied knowledge and understanding**

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

- Apply the knowledge of human anatomy and neuroanatomy to better understand human physiology and physiopathology, an indispensable skill for professionals in the field of human health.
- Apply the knowledge of physiology to understand the mechanisms underlying the maintenance of homeostasis and foresee the potential consequences arising due to alterations of these mechanisms.

- apply the knowledge of histology to understand other closely related branches of biology such as anatomy, cytology and physiology.
- use the knowledge acquired during this course to further study some specific topics required by the nursing profession.

### **Communication skills**

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

- describe the anatomical structures and functions of human body using the correct terminology so as to be able to adequately communicate verbally or in writing, within the care facilities, with patients of all ages and/or with other health professionals.
- use the correct scientific terminology to describe the microscopic and macroscopic characteristics of the organs and to describe the physiological processes underlying their function.
- use the correct scientific terminology to identify, at a microscopic level, the different types of cells and tissues present in the human organism.

### **Problem solving skills**

The knowledge of anatomy, physiology and histology will help the students develop critical thinking and decision making skills enabling them to respond to different levels of nursing care complexity.

### **Learning skills**

The student will have acquired skills and methods of learning necessary to further develop and improve their competencies in the field of anatomy, histology and physiology, by consulting the scientific literature.

## **COURSE SYLLABUS**

### **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.

### **Syllabus 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 O<sub>2</sub> and CO<sub>2</sub> across the respiratory membrane. Transport of O<sub>2</sub> and CO<sub>2</sub> 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: reabsorption and tubular secretion. Homeostatic functions of the kidney. Control of osmolality and volume of extracellular fluid: general principles.
- endocrine system. Definition and classification of hormones. General characteristics of the endocrine glands and the function of their hormones
- digestive SYSTEM organization of the digestive system. Motility and gastrointestinal secretions. General principles of digestion and absorption of nutrients.

## **Syllabus HISTOLOGY**

- Introduction to histology ; classification of tissues ; preparation of tissues for histological analysis. Microscopy, preservation of biological structures, stainings.
- Epithelial tissue. General characteristics of epithelia, junctions, polarity of epithelial cells, surface specializations, basal lamina, classification of epithelia, endothelium, absorptive epithelium, pseudostratified epithelium, transitional epithelium, epidermis, glandular epithelia (exocrine and endocrine glands).
- Connective tissue. Histological organization: extracellular matrix (ground substance, collagen and elastic fibers) and cells (fibroblasts, adipocytes, macrophages, plasma cells and mast cells). Classification of connective tissue ; connective tissue proper: loose and dense (irregular and regular). Specialised connective tissues: cartilage (cells and extracellular matrix, hyaline, elastic and fibrous cartilage, growth and repair) ; bone (cells and extracellular matrix, compact and spongy bone, osteogenesis, growth and repair) ; white and brown adipose tissue ; Blood: plasma and serum, cells (red blood cells, neutrophils, eosinophils, basophils, monocytes and lymphocytes), platelets, hematopoiesis. Outline of the lymphatic system.
- Muscle tissue. Skeletal muscle: organization of muscle fibers, myofibrils and myofilaments, sarcomere, sarcoplasmic reticulum, neuromuscular junction, contraction mechanism, regeneration. Cardiac muscle: structure of cardiomyocytes (intercalated discs, sarcoplasmic reticulum, myofilaments), Purkinje fibers, regeneration. Smooth muscle: structure of smooth muscle cells, contractile apparatus, regeneration.
- Nervous tissue. The neuron. Myelinated and unmyelinated nerve fibers. General structure of the nerves. Synapses. Glial cells.

## **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 facilitated by projecting images (Power-Point) and Anatomical 3D Real-time Viewer tools (Complete anatomy tools) and anatomical modelling. During exercises, students will use anatomical modelling, reproducing organs and anatomical systems in a fully equipped practical exercise 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 will be supported by visual aids (slides, animated movies, etc.) to stimulate the interest of students and assist teachers in explaining different concepts.

The module of Histology will consist of 14 hours of frontal teaching (divided into lessons of 2 or 4 hours according to the academic calendar) accompanied by Power Point presentations, images of histological preparations obtained with an optical microscope, and electronic and audiovisual media.

At the end of each module, the students will undertake a mock exam, to familiarise themselves with the final exam format and identify existing knowledge gaps.

## **COURSE GRADE DETERMINATION**

The examination of the Integrated Course of Anatomy and Physiology consists of a written exam with 30 multiple choice questions for each of the 3 modules, Human Anatomy, Physiology and Histology (90 questions in total), followed by an oral exam. All the contents in the syllabus are subject to evaluation. The

exam will be considered passed if the student obtains the minimum pass score of 18/30 in both the written and the oral exam. Only the students that pass the written exam will be admitted to the oral exam.

At the oral exam the students will be assessed according to the following criteria:

<b>&lt; 18</b> <b>insufficient</b>	The candidate possesses an inadequate knowledge of the topic, poor presentation skills, and makes significant errors in applying theoretical concepts.
<b>18 - 20</b>	The candidate possesses a barely adequate and only superficial knowledge of the topic, limited presentation skills, and only an inconsistent ability to apply theoretical concepts.
<b>21 – 23</b>	The candidate possesses an adequate, but not in-depth, knowledge of the topic, a partial ability to apply theoretical concepts, and acceptable presentation skills.
<b>24 – 26</b>	The candidate possesses a fair knowledge of the topic, a reasonable ability to apply theoretical concepts correctly and present ideas clearly.
<b>27 - 29</b>	The candidate possesses an in-depth knowledge of the topic, a sound ability to apply theoretical concepts, good analytical skills, and is able to make interdisciplinary connections and clearly summarise various topics
<b>30 - 30L</b>	The candidate possesses an in-depth knowledge of the topic, an outstanding ability to apply theoretical concepts, exceptional reasoning and analytical skills with an excellent ability to establish interdisciplinary connections.

The grade obtained in each module will contribute to the final score in proportion to the total credits for each module. The final grade will be assigned by the Commission.

## OPTIONAL ACTIVITIES

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

## READING MATERIAL

### Reading material for HUMAN ANATOMY

- Martini, F., Timmons, M. J., Tallitsch, R. B., Ober, W. C., Garrison, C. W., Welch, K. B., & Hutchings, R. T. (2014). Human anatomy (p. 904). Prentice Hall
- Halliday, Nancy L., and Harold M. Chung. 2021. BRS Gross Anatomy. 10th ed., North American Edition. Wolters Kluwer
- Martini, F. H., & Nath, J. L. (2009). Fundamentals of Anatomy & Physiology (8 uppl.)
- Tortora, G. J., & Derrickson, B. H. (2018). Principles of anatomy and physiology. John Wiley & Sons
- The students are encouraged to use an Atlas of Human Anatomy.

**Reading material for PHYSIOLOGY**

- Koeppen, B. M., & Stanton, B. A. (2017). Berne and levy physiology (7 edition). Elsevier Health Sciences
- Martini, F. H., & Nath, J. L. (2009). Fundamentals of Anatomy & Physiology (8 uppl.)
- Sherwood, L. (2015). Human physiology: from cells to systems. Cengage learning.
- Guyton, A. C., & Hall, J. E. (2021). Textbook of medical physiology (14 edition). Philadelphia: Saunders

**Reading material for HISTOLOGY**

- Anthony L. Mescher. (2023) Junqueira's Basic Histology: Text and Atlas (17th Edition). McGraw Hill / Medical
- Gartner, L.P., & Lee, L.M.J. (2022) Gartner & Hiatt's Atlas and Text of Histology (8th Edition). LWW