



MIDWIFERY COURSE

Teaching: **ANATOMY AND PHYSIOLOGY**

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

Number of CFU: 6

Responsible Professor: Micol Massimiani

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MODULE of Human Anatomy

SSD: BIO/16

Number of CFU: 3

Professor: Giulia Ponterio

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MODULE of Physiology

SSD: BIO/09

Number of CFU: 2

Professor: Massimo Scorretti

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MODULE of Histology

SSD: BIO/17

Number of CFU: 1

Professor: Micol Massimiani

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PREREQUISITES

Mandatory preparatory knowledges are not required, however basic knowledge about biology, histology and cytology are necessary

LEARNING OBJECTIVES

Aim of the teaching is: 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, to provide students with knowledge on the basic concepts and the normal quantitative parameters of the bodily functions and their variations in the different conditions of dynamic engagement, to develop in the student the ability to understand the principles of the functioning of the human body. The cellular mechanisms and the integrated functions of the main organs and apparatuses aimed at the maintenance of body homeostasis will also be analyzed in the context of environmental modifications. The student will need to be able to acquire correct terminology and develop those skills of interpretation and application that, the graduate in Midwifery, will then have to use in the planning and management of work activities.



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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, lymphatic 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 of the functions of the organs and apparatuses
- how to interpret mechanisms and anatomical-physiological phenomena.
- the mechanisms implemented by the control systems of the functions of the organs and apparatuses
- the structures of the various tissues that compose the human organism
- the histological organization of the various human organs
- how to identify the morphology of the tissues, the cells that compose them, from a morphological and functional point of view
- 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 pathophysiology, necessary knowledge equipment for professionals in the field of human health;
- use the knowledge of cell physiology to understand the mechanisms underlying the maintenance of homeostasis;
- use the integrated knowledge of Anatomy and Physiology on the integration and control systems that regulate the main phenomena of absorption and excretion of nutrients;
- 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 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. 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.



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Making judgements

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

COURSE SYLLABUS

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: Temporomandibular 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, tacts, 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.

General principles of integumentary system.

PHYSIOLOGY

INTRODUCTION TO PHYSIOLOGY AND HOMEOSTASIS: Description of physiological mechanism. Structure-Function relationships of the body. Levels of organization in the body. Concept of Homeostasis. Homeostatic Control Systems.

CELL PHYSIOLOGY AND PLASMA MEMBRANE: Membrane transport of ions and molecules. Membrane potential and action potentials. Synapses and neuronal integration. Intercellular communication and signal transduction. Neurotransmitters.



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MUSCLE PHYSIOLOGY: Motor unit, neuromuscular junctions. Excitation and contraction of skeletal muscle tissue. Skeletal muscle contraction and mechanics. Physiology of skeletal, smooth and cardiac muscle.

PHYSIOLOGY OF THE NERVOUS SYSTEM: Functional organization of central nervous system and peripheral nervous system. The peripheral nervous system: afferent and efferent divisions. Role of glia cells. Autonomic nervous system. Integrative functions of nervous system.

CARDIAC PHYSIOLOGY: Anatomy and electrical activity of the heart. Mechanical events of the cardiac cycle. Cardiac output and its control. General principles of hemodynamics. Blood vessels and blood pressure. Blood and hemostasis.

PHYSIOLOGY OF ENDOCRINE SYSTEM AND REPRODUCTIVE SYSTEM: General principles of endocrinology. Principles of general functioning of hormones. Central and peripheral endocrine glands and their hormones. Hypothalamic-Pituitary Axis. Control of calcium and phosphate metabolism. Physiology of male and female reproductive system.

PHYSIOLOGY OF RESPIRATORY SYSTEM: Respiratory anatomy and mechanic. Gas exchange and transport of oxygen and carbon dioxide. Control of respiration.

PHYSIOLOGY OF URINARY SYSTEM: Elements of renal function: kidney and nephron. Glomerular filtration. Tubular reabsorption and tubular secretion. Urinary tract. Ureter, bladder and urethra. Urine excretion and plasma clearance.

PHYSIOLOGY OF DIGESTIVE SYSTEM: Digestive tract and accessory digestive organs. General aspects of digestion. Secretory function of digestive system. Motility of digestive tract. Nutrient digestion and absorption

HISTOLOGY

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 (macromolecules of the ground substance, collagen and elastic fibers) and connective cells (fibroblasts, adipocytes, macrophages, plasma cells and mast cells). The different types of connective proper: loose and dense (irregular and regular). The white and brown adipose tissue. Supportive connective tissues: cartilage (cells and extracellular matrix, hyaline, elastic and fibrous cartilage, growth and repair) and bone (cells and extracellular matrix, compact and spongy bone, osteogenesis, growth and repair). 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.



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COURSE STRUCTURE

The module 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 28 Hours of frontal lessons according to academic calendar. The Histology module 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 audio-visual media.

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.

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 contribute to the final score in proportion to the credits. The exam consists of a written test and an oral test that must be passed on the same day. Only students who reach the minimum score of 15/30 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. 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.

The evaluation criteria considered will be: acquired knowledge, independent judgment, communication skills and learning skills. The exams will be assessed according to the following criteria:

< 18 Fail	The candidate possesses an inadequate knowledge of the topic, makes significant errors in applying theoretical concepts, and shows weak presentation skills.
18-20	The candidate possesses a barely adequate and only superficial knowledge of topic, limited presentation skills, and only an inconsistent ability to apply theoretical concepts.
21-23	The candidate possesses an adequate, but not in-depth, knowledge of the topic, a partial ability to apply theoretical concepts, and acceptable presentation skills.
24-26	The candidate possesses a fair knowledge of the topic, a reasonable ability to apply theoretical concepts correctly and present ideas clearly.
27-29	The candidate possesses an in-depth knowledge of the topic, a sound ability to apply theoretical concepts, good analytical skills, clear argumentative clarity and an ability to



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	synthesize.
30-30L	The candidate possesses an in-depth knowledge of the topic, an outstanding ability to apply theoretical concepts, a high level of argumentative clarity, as well as excellent analytical skills, and a well-developed ability to synthesize and establish interdisciplinary connections.

READING MATERIALS

A list of recommended texts is shown below:

ANATOMY AND PHYSIOLOGY

- Martini Nath: Fundamentals of Anatomy and Physiology (EdiSeS)
- Gerard J. Tortora Bryan Derrickson: Principles of Anatomy and Physiology (Ambrosiana)

Students are strongly encouraged to use a Human Anatomy Atlas

HISTOLOGY

- “Bloom and Fawcett's Concise Histology”, Don W. Fawcett, Ronald P. Jensh, William Bloom – 2nd Edition - Hodder Arnold

The bibliography and teaching materials necessary for the preparation for the final evaluation will be amply discussed by the Professors at the beginning of the lessons to better guide the students in the choice of texts and study materials.