GENERAL OBJECTIVES
The general objectives of this subject are for students to learn the principles of embryonic development and the theoretical foundations of morphological and functional aspects of human anatomy of the central nervous system, sense organs and the cardiorespiratory, digestive and urogenital apparatus. The course will also introduce the foundations for identifying different anatomical structures through image analysis to allow students to integrate anatomical knowledge into the principal radiological explorations for clinical diagnosis.

SPECIFIC OBJECTIVES
As a result of the learning process, the student should be able to:

- Apply the appropriate anatomical nomenclature to describe structures and their localization, as well as the medical terminology associated with their respective functions.
- Describe the principal stages of development or organogenesis of the different apparatus and systems studied.
- Understand the principles of anatomical organization of the central nervous system and deduce the possible alterations to its normal function.
- Produce cross sections of portions of the apparatus and systems studied that have particular clinical relevance.
- Recognize studied structures and organs in a cadaver, according to shape and topography, and relate this to knowledge gained from image analysis techniques (Rx, TC, RMN).
- Describe the structure, normal patterns of arterial, venous and lymphatic vascularization, innervation and function of the apparatus and systems studied.

PROGRAMME

Theory

I. NEUROANATOMY

Introduction and morphogenesis of the nervous system
1. Introduction to the nervous system. Generalities, functions and systematization of the nervous system.

Organization of the brain
5. Organization of the cerebral cortex. Principal types of cortex: isocortex and allocortex.
15. Internal capsule. Systematization of fascicles that pass through the internal capsule. Functional significance.

Organization of the encephalic trunk and cerebellum.
17. Organization of the nuclei of cranial nerves. Functional components of cranial nerves. Systematization of their nuclei of origin and termination.
18. Somitic cranial nerves. Oculomotor nerves: oculomotor (III), trochlear (IV) and abducens (VI). Extrinsic ocular musculature.
19. Somitic cranial nerves II. Hypoglossal nerve (XII).
20. Branchial cranial nerves I. Trigeminal nerve (V).
22. Branchial cranial nerves III. Glossopharyngeal (IX), vagus (X) and spinal (XI) nerves.
27. Cerebellum II. Divisions according to phylogenetic and functional criteria. Extrinsic cerebellar connections.

Organization of the spinal medulla. Nerve pathways.
29. Organization of grey matter in the spinal medulla: nuclei and Rexed’s laminae. Segmental and multisegmental connections.
33. Spinocerebellar system. Unconscious proprioceptive sensitivity pathways.
34. Descending systems I. Pyramidal motor system. Head motility pathway. Trunk motility pathway.

Meninges, cephalorachidian liquid and vascularization.
38. Arterial irrigation of the CNS. Arteries of the encephalon: carotid system and vertebrobasilar system. Spinal arteries.
Vegetative nervous system
42. Sympathetic nervous system. Cervical, thoracic, lumber and sacral sympathetic.

II. ESTHESIOLOGY
Auditory apparatus
44. Inner ear. Osseous labyrinth. Membranous labyrinth. The organ of Corti.

Visual apparatus

III. SPLANCHNOLOGY
Introduction

Cardiorespiratory apparatus
53. Heart I. Morphology. Cardiac walls, partitions and cavities. Cardiac valves.

Digestive apparatus
64. Stomach II. Vascularization. Innervation. Function.

Urinary apparatus
76. Urethra. Female and male urethra. Morphology. Relations.

Genital apparatus

Practical training

Neuroanatomy
1. Generalities of the Central Nervous System. Embryology of the CNS.
2. External morphology of the brain.
3. Internal morphology of the brain: grey nuclei and formations of the hippocampus.
4. Internal morphology of the brain: white matter.
5. External morphology of the encephalon trunk, cerebellum and spinal medulla.
7. Peripheral path of cranial pairs I: Ocular motor nerves (III, IV, VI).
8. Peripheral path of cranial pairs II: Trigeminal nerve.
9. Peripheral path of cranial pairs III: Facial, vestibulo-cochlear, glossopharyngeal, vagus (cephalic part) and spinal nerves.
10. Arterial vascularization of the encaphalon and spinal medulla. External carotid artery.
11. Cranial and spinal meninges. Venous vascularization of the encephalon and spinal medulla.

Splanchnology
2. Respiratory apparatus II: Trachea, principal bronchia and lungs.
4. Radiological anatomy of the respiratory apparatus, heart and mediastinum.
5. Digestive apparatus I: oral cavity, saliva glands, pharynx and oesophagus (cervical and thoracic).
6. Digestive apparatus II: oesophagus (abdominal), stomach, small intestine (duodenum), pancreas, liver and spleen.
7. Digestive apparatus III: small intestine (jejunum, ileum), large intestine, rectum (intraperitoneal portion).
9. Urinary apparatus
10. Male genital apparatus.
11. Female genital apparatus.

**LEARNING RESOURCES AND TEACHING METHODOLOGIES**

Students will work towards the planned objectives and follow the teaching programme through the following means:

**Theory classes**
The areas outlined in the theory programme will be presented systematically, focusing particularly on functional aspects and those elements that require a higher degree of spatial and topographical understanding.

**Practical classes**
Practical classes will be held in:

a) **Dissection room:**
Students will receive direct explanations of the cadaver or anatomically dissected samples, relating to morphology, localization, topography, vascularization and innervation of the studied structures.

b) **Seminars/bone bank:**
Practical seminars focusing primarily on:
- Sectional anatomy, correlating anatomical models and standard imaging techniques (X-ray, CT, NMR) presented as X-rays and slides.
- Functional and applied anatomy, where appropriate audiovisual material will be used to analyze practical problems with particular relevance to doctor training and future professional practice.

c) **Microscope room:**
Planned practical sessions will involve the interpretation of embryological and central nervous system histological preparations.

d) **Multimedia seminar:**
Provided the necessary IT facilities are available, students will have access to programmes that aid understanding of the anatomical structures and functional interrelations studied previously on the cadaver or real anatomical samples. Students will also have access to interactive software designed to provide assisted learning of human anatomy.