UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Anatomy 1

**2627-1-H4103D155-H4103D15501**

## Aims

The educational objectives of the module are aimed at providing the following competencies:
Knowledge of the general organization of the human body (General Anatomy);
Knowledge of the general organization of the blood and lymphatic circulation;
Understanding of the morphological and functional characteristics of the musculoskeletal system and the organs that make up the respiratory, digestive, urinary, genital, integumentary, endocrine, cardiovascular, and lymphatic systems (Systemic Anatomy);
Knowledge of the distribution of organs and vascular and lymphatic structures in the different regions of the body, with corresponding references to the body surface (Regional and Topographic Anatomy).

Teachnig will include reference to topographic, radiologic, and clinical anatomy.

The primary aim of the teaching is to provide a good knowledge of the gross anatomy of the human body, and of age-related changes, necessary for a correct physical examination and for understanding the diseases pathogenesis.

## Contents

The module aims to teach the principles of general anatomy and the characteristics of the organs and structures contained within all systems of the human body, with particular attention to morphological and functional aspects, their location, and their relationships with other organs and structures. Knowledge of embryological development and changes across the different stages of life is also included in the content of this module.

The central and peripheral nervous system, as well as the sensory organs (eye and ear), are excluded, as they will be covered in a subsequent module.

Anatomo-clinical correlations will be specifically addressed.

## Detailed program

### GENERAL ANATOMY

The different approaches to the study of human anatomy: gross and microscopic anatomy; systematic, topographic, regional, radiological, clinical anatomy.

Principles of organization of the human body: cells, tissues, organs and systems. Serous cavity and connective spaces, their location and content. Development of the body cavities from the primitive intraembryonic coelom.

Anatomical terminology: planes, axes, lines and anatomical landmarks; terms of position, terms related to movements.

### REGIONAL ANATOMY

**THE HEAD**
Surface anatomy.
Skeletal landmarks of the head: nasion, vertex, superior nuchal line, external occipital protuberance, mastoid process, zygomatic arch, pterion, anterior and posterior borders of the ramus of mandibula, superciliary ridges.
Basic anatomy.
The scalp and its layers. Muscle of the scalp. Muscles of facial expression and muscle of mastication.
Bones of the face. The skull and cranial fossae (see muscular-skeletal system). Temporomandibular joint.
External nose, nasal cavity and paranasal sinuses. Bony skeleton. External, internal opening and walls of the nasal cavity. Location, relations and morphological features of paranasal sinuses.
Parotid region: parotid gland and duct, their location, relations and morphological features. Submandibular and sublingual glands: location, relations and morphological features.
Oral cavity: subdivision in vestibule and mouth cavity proper; teeth (deciduous and permanent) and their general structure; lips; palate and floor of the mouth with their muscles; tongue, its relations and morphological features, extrinsic and intrinsic muscles.
The tonsils in the nasopharynx and oropharynx (Waldeyer's limphatic ring)
Orbital region: Eyelids, lacrimal apparatus, orbital margins and walls, openings into the orbital cavity, orbital muscles.
Main arteries, veins and nerves contained in the head.
Vascular supply of the visceral structures within the head region

The eye: see “Special senses” in ANATOMY 2

The ear: see “Special senses” in ANATOMY 2

**THE NECK**
Surface anatomy.
Surface landmarks of the neck: hyoid bone, upper border of the thyroid cartilage, isthmus of the thyroid gland, suprasternal notch, nuchal groove, sternocleidomastoid and trapezius muscles, platisma muscle, external jugular vein.
Basic anatomy.
Skin, superficial fascia, platysma muscle. Hyoid bone. Deep cervical fascia: investing, pretracheal and prevertebral layers, carotid sheath. The triangles of the neck: anterior, posterior and their subdivision. Superficial muscles: sternocleidomastoid and trapezius. Suprahyoid and infrahyoid muscles. Anterior, lateral and posterior vertebral muscles with focus on scaleni muscles.
Organs located in the neck: thyroid and parathyroid glands, pharynx , larynx, cervical portion of esophagus and trachea.
Vascular supply to the organs located in the cervical region

Main arteries, veins, nerves and plexuses contained in the neck.

**THE TORAX**

Surface anatomy.

Skeletal landmarks on anterior chest wall: suprasternal notch, sternal angle, xiphisternal joint, subcostal angle, ribs; Skeletal landmarks on posterior chest wall: spinous processes of the thoracic vertebrae, superior angle, inferior angle and spine of the scapula. Projection of breast and nipple, heart, lungs and pleura, aortic arch, superior vena cava, tracheal bifurcation on the thoracic wall. Lines of visceral and parietal pleural reflection, costodiaphragmatic recess.

The thoracic wall.

Skin and extrinsic chest muscle (thoracoappendicular and spinoappendicular). Thoracic cage and its components: thoracic vertebrae, ribs, sternum and costal cartilages. Intercostal spaces, intercostal muscles, intercostal vessels and nerves, endothoracic fascia, suprapleural membrane. Detalied knowledge of diaphragm: origin, morphological features, openings and structures that each one transmit, action, blood and nerve supply. Thoracic outlet: its relations to vessels, nerves and organs.

The thoracic cavity.

Division into a median part, the mediastinum, and two lateral parts, the pleural spaces containing lungs.

Mediastinum: definition, borders, subdivision in superior and inferior (plane of division). Vessels, nerves, organs and other structures contained in the two parts of mediastinum, with major focus on heart and pericardium. Thoracic duct.

Organs contained in the thoracic cavity: lungs and pleurae, heart and pericardium, trachea, principal bronchi and bronchial tree, thymus, esophagus

Vascular supply to the organs located in the thoracic region

Main arteries, veins, nerves and plexuses contained in the thoracic cavity

**THE ABDOMEN**

Surface anatomy.

Surface landmarks of the abdominal wall: xiphoid process, costal margin, iliac crest, pubic tubercle, symphysis pubis, inguinal ligament, superficial inguinal ring, umbilicus, linea alba, linea semilunaris and tendinous insersections of the rectus abdominis. Abdominal lines: transpyloric plane, subcostal plane, intercristal plane. Abdominal quadrants.

Abdominal wall.

Anterolateral abdominal wall. Skin, superficial fascia, deep fascia. Muscles: external and internal oblique, transversus, rectus abdominis, pyramidalis. Rectus sheath. Fascia transversalis. Arteries, veins, limph vessels and nerves of the anterolateral abdominal wall. Inguinal canal: deep and superficial inguinal rings, walls of the inguinal canal. Development of the inguinal canal. Fascial layers of the spermatic cord and scrotum.

Posterior abdominal wall. Lumbar vertebrae. Iliac part of the hip bone. Muscles: psoas major, quadratus lumborum, transversus abdominis, diaphragm.

Peritoneum: general arrangement, ligaments, omenta, mesenteries, peritoneal cavity. Relationships of the different organs to their peritoneal covering. Intraperitoneal, retroperitoneal and subperitoneal organs. Peritoneal pouches, spaces and recesses. Lesser sac and epiploic foramen. Functions of the peritoneum.

Organs contained in the abdominal cavity: stomach, duodenum, cecum, ascending, descending and transverse colon, appendix, liver, gallbladder, spleen, kidney, pancreas.

Vascular supply to the organs located in the abdominal region.

Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the abdominal cavity.

**THE PELVIS**

Surface anatomy.

Pubic tubercle, symphysis pubis, posterior part of sacrum, sacral hiatus, coccyx.

Pelvic walls.

Hip bones, sacrum and coccyx, symphysis pubis, sacroiliac joints, promontory of sacrum, ileopectineal line, pubic arch. Pelvic inlet and pelvic outlet. Sacrotuberous and sacrospinous ligaments. Greater and lesser sciatic foramina. Anterior, posterior and lateral pelvic walls. Relation to sacral plexus.

Major focus on pelvic floor (inferior pelvic wall) : pelvic diaphragm with levator ani muscle and its different groups of muscular fibers; pelvic fascia.
Perineum. Anal triangle and its contents; anal sphincter; ischiorectal fossa and pudendal canal. Urogenital triangle: urogenital diaphragm and superficial perineal pouch. In male: penis, scrotum and male urethra. In female: clitoris, female urethra, greater vestibular glands, vagina, vulva.
Organs contained in the pelvic cavity: sigmoid colon, rectum, ureters, urinary bladder. In male: vas deferens, seminal vesicles, ejaculatory ducts, prostate, prostatic urethra. In female: ovary, uterine tube, uterus, vagina.
Vascular supply to the organs located in the pelvic region
Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the pelvic cavity

**UPPER AND LOWER LIMBS**
Detailed knowledge of all the bones, joints and muscles.
Vascularization of the limbs and main relationships of the blood vessels; lymphatic circulation.
Innervation of the limbs is covered in ANATOMY 2

**** SYSTEMATIC ANATOMY****

**MUSCULAR-SKELETAL SYSTEM (LOCOMOTOR)**
Classification of bones, muscles and joints, their general structure and function.

*The skull.* Neurocranium and facial bones. General architecture of the skull and main characteristics of the individual bones. External view of the skull as a whole: anterior, superior, posterior. Lateral view: temporal, infratemporal and pterygopalatine fossae and their contents. Inferior view: anterior, middle and posterior region. The cranial cavity: vault and base. Base of the skull: anterior, middle, posterior cranial fossae with their major foramina; nerves and/or vessels that each foramen transmits. Cranial sutures and craniometric points. Neonatal skull. Nasal cavity, orbital cavity, paranasal sinuses. Temporomandibular joint. Mimic and masticatory muscles.
*Vertebral column*. General characteristics of the vertebrae and regional differences. Atypical cervical vertebrae: atlas and axis. Atlanto-occipital and atlanto-axial joints. Other joints of the vertebral column. General features of the muscles of the back.
*Neck*. Muscles and fasciae of the neck. See details in REGIONAL ANATOMY.
*Chest*. Bones and cartilages of the thoracic cage. Joints of the ribs and costal cartilages. Extrinsic and intrinsic muscles of the thorax, respiratory muscles, in particular diaphragm muscle. See details in REGIONAL ANATOMY
*Shoulder girdle and upper limb*. Anatomical characteristics of the different bones. Shoulder, elbow, radio-ulnar, wrist joints, general features of the other joints. Muscles of the shoulder, the rotator cuff; arm, forearm and hand muscles.
Vascularization of the upper limb and main anatomical relationships of its blood vessels
*Pelvis and lower limb*. Morphological feature of hip bones in detail, and of the other bones of the lower limb. Joints and ligaments of the pelvis, hip, knee; tibio-fibular, ankle and tarsal joints; general features of the other joints. Hip, thigh, leg and foot muscles. Scarpa's triangle and adductor canal. Femoral sheath and femoral canal. Vascularization of the lower limb and main anatomical relationships of its blood vessels.
*Abdominal wall. *
Muscles of the anterolateral and posterior abdominal wall. Inguinal ligament. Inguinal canal. See details in REGIONAL ANATOMY.
Pelvic floor.
Pelvic diaphragm. Perineum. Abdominal wall. See details in REGIONAL ANATOMY.

***CARDIOVASCULAR SYSTEM***
*Heart.* morphological features of external surface, cardiac chambers, cardiac valves, conducting system. Structure of the heart wall. Large arteries and veins leaving or entering the heart. Pericardium: serous, fibrous pericardium and pericardial sinuses.
*Blood vessels*. Vessels general structure: arteries, veins, capillaries. Anastomoses. Fetal circulation and its modification at birth. General organization of adult circulatory system, pulmonary and systemic vascularization.
In systemic circulation major focus on: aorta and its branches; blood supply of the upper and lower limbs; blood supply of all organs and of the orbits, nasal and oral cavities; superior and inferior caval veins system; portal vein, portal-systemic anastomoses; parietal vessels.

Blood-brain barrier.

***LYMPHATIC SYSTEM***

General organization of the lymphatic circulation. Thoracic and right lymphatic ducts: origin and course, relation with organs and other structures. Other major lymphatic trunks. Main lymph node chains and stations. Lymphoid organs: thymus, spleen, lymph nodes and tonsils; their position, relations and morphologic features. Limphatic drainage of the limbs, neck, chest, abdomen and pelvis.
Blood supply of all the structures and organs of the lymphatic system.

***RESPIRATORY SYSTEM***

Nose, nasal and paranasal cavities: see regional anatomy. Position, relations and morphological features of the respiratory tract organs: pharynx, larynx, tracheo-bronchial tree, lungs. Pulmonary segments and lobes.
Blood supply of the organs of the respiratory system.
Pleurae: visceral and parietal pleura, pleural cavity, regional nomenclature.

***DIGESTIVE SYSTEM***

Oral cavity, parotid region, esophagus: see regional anatomy.
Position, relations and morphological features of the gastrointestinal tract organs: esophagus, stomach, small intestine (duodenum, jejunum, ileum), large intestine (cecum, appendix, colon and rectum). Other organs of the digestive system: liver, bile ducts, gallbladder, pancreas; their position, relations, morphological features. Relationships of the different organs to their peritoneal covering. Intraperitoneal, retroperitoneal and subperitoneal organs.
Blood supply of the oral cavity, tongue, salivary glands and of all the organs of the digestive system.

***URINARY SYSTEM***

Position, relations and morphological features of the urinary tract organs: kidney with its covering, renal pelvis, minor and major calyces, ureter, bladder, female urethra, male urethra with the main aspects of its three parts (prostatic, membranous and penile).

Blood supply of the organs of the urinary system.

***ENDOCRINE SYSTEM***

General characteristics of hormones.
Position, relations and morphological features of the endocrine organs: pituitary gland and its connection with the hypothalamus, thyroid, parathyroid, adrenal gland, endocrine pancreas, pineal gland. Gastroenteropancreatic (GEP) system.
Blood supply of the organs of the endocrine system.

***FEMALE REPRODUCTIVE SYSTEM***

Position, relations and morphological features of the female genital organs: ovary, uterus, uterine tube, vagina. External genitalia: morphology and structure. Main characteristics of placenta.
Blood supply of the organs of the female reproductive system.

***MALE REPRODUCTIVE SYSTEM***

Position, relations and morphological features of the male genital organs: testis, epididymis, vas deferens, prostate, seminal vesicles and bulbourethral glands. Fascial layers of the spermatic cord and scrotum. External genitalia: morphology and structure.
Blood supply of the organs of the male reproductive system

***INTEGUMENTARY SYSTEM***

Skin and its appendages. Different types of skin. Skin functions. Skin lines. Age-related skin changes. Mammary gland: position, relations and morphological features. Lymphatic drainage of the mammary gland.

**CLINICAL ANATOMY**

The anatomical bases of some common diseases involving different organs and systems will be treated during

lessons and laboratories and also discussed through clinical cases.

***NERVOUS SYSTEM***
in ANATOMY 2

***SPECIAL SENSES***
in ANATOMY 2

## Prerequisites

College-level scientific knowledge

## Teaching form

30 lectures 2h/each in presence
6 interactive lessons 2h/each in presence
12 practical interactive lessons 2h/each in presence

Some of the lessons are interactive and focus on aspects of functional, radiological, and clinical anatomy, with the participation of clinical faculty members from various specialties.
During interactive sessions, students can deepen their knowledge of the topics covered in lectures.
Students have access to anatomical models (including the skull and skeleton; upper and lower limbs; heart; thorax and abdomen; male and female pelvis) for identifying the main features of the different organs and of the skeleton, as well as virtual 3D models.
Part of the practical sessions take place in the computer lab, where students engage with anatomical images (radiological, from cadavers or other sources) and are required to identify different anatomical structures. In other sessions, students answer questions related to the lecture content to assess their understanding. In addition, simple anatomo-clinical cases are presented, allowing students to apply the knowledge acquired, followed by discussion with the instructor.
Additionally, optional study groups are organized during which the “Anatomage” table—a 3D digital visualization system that allows virtual dissections—is used.

Frontal lessons, seminars, problem-solving sessions with clinical case simulations will be in italian.

## Textbook and teaching resource

Suggested Textbooks for Anatomy 1-2A-2B
-G. Anastasi e altri autori. Trattato di Anatomia Umana (3 volumi). Edi-Ermes (ed).
-“Prometheus” testo-atlante di Anatomia, II edizione, 3 volumi
-S. Standring. Anatomia del Gray – Le basi anatomiche per la pratica clinica – EDRA
-Chiarugi. Collana Istituzioni Anatomia dell'Uomo. Opera in 5 volumi - a cura di Chiarugi, Bucciante. Piccin
-H. Ellis/V. Mahadevan. Anatomia clinica (ed. Italiana a cura di F. Cappello). Idelson-Gnocchi

Atlas:
-Netter. Atlante di anatomia umana - Edra
-Anatomia umana. Atlante. Curatori: G. Anastasi, C. Tacchetti - Edi. Ermes

-Sobotta – Atlante di Anatomia Umana - Elsevier

Please, take into consideration the last edition

## Semester

This teaching unit will be in the 2st term of the first year.

## Assessment method

An extensive mid-course assessment is scheduled for the end of the 2nd term of the 1st year.
For the details see General Syllabus of "Human Anatomy and Histology".

## Office hours

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## Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY