Annex No. 1.5 to the Rector's Order of the UR No. 61/2025

SYLLABUS

Concerning the cycle of education **2025- 2031**

Academic year 2025/2026

1. BASIC INFORMATION CONCERNING THIS SUBJECT / MODULE

Subject / Module	**Anatomy**
Course code / module *	**A/A**
Faculty (name of the leading direction)	**Faculty of Medicine, University of Rzeszow**
Department Name	**Department of Correct Anatomy**
Field of study	**Medicine**
Level of education	**Uniform Master studies**
Profile	**General academic**
Form of study	**Non-stationary**
Year and semester	**Year I, semester 1,2**
Type of course	**Obligatory**
Language of instruction	**English**
Coordinator	**Associate Professor Krzysztof Balawender M.D. PhD**
Name of the instructor(s)	**Associate Professor Krzysztof Balawender M.D. PhD** **Maksymilian Kłosowicz M.D.** **Aleksandra Burbelka M.D.** **Anita Krowiak M.D.**

* - according to the resolutions of the Faculty of Medicine

1.1. Forms of classes, number of hours and ECTS points

Semester	Lecture	Exercise	Conversation	Laboratory	Seminar	Practical	Self-learning	Number of points ECTS
I	15	60	-	-		-		**8**
II	15	60	-	-		-		**5**

1.2. The form of class activities

☒classes are in the traditional form

☐classes are implemented using methods and techniques of distance learning

1.3. Examination Forms / module (exam**, credit with grade** or credit without grade)

2. REQUIREMENTS

Knowledge about the structure and functioning of the human body at the high school level.

3. OBJECTIVES, OUTCOMES, AND PROGRAM CONTENT USED IN TEACHING METHODS

3.1. Objectives of this course/module

C1	Understanding the detailed anatomical structure of the human body based on descriptive anatomy, which divides the human body into particular systems considered in sequence: bone, muscle, digestive, respiratory, urogenital, internal, vascular, nervous, common and sensory organs.
C2	Understanding correct human body structure determines the functions of organs, systems and the organism as a whole. Dynamic development of imaging techniques of human body structures; radiology, computed tomography, magnetic resonance imaging and others that enable the visualization of structures and the interpretation of topographical relations between them, requires knowledge of normal anatomy. The student of the medical faculty, having knowledge in all the above-mentioned areas, acquires the ability to interpret the construction of the living subject to a degree that enables understanding of clinical issues and is prepared to the extent necessary to expand it in subsequent years of study and informed practical medical practice.

3.2. Outcomes for the course

EK (the effect of education)	The content of learning outcomes defined for the class (module)	Reference to directional effects (**KEK**)
EK_01	KNOWS THE STRUCTURE OF THE HUMAN BODY IN A TOPOGRAPHICAL AND FUNCTIONAL APPROACH, INCLUDING THE TOPOGRAPHICAL RELATIONS BETWEEN THE VARIOUS ORGANS, ALONG WITH ANATOMICAL, HISTOLOGICAL AND EMBRYOLOGICAL NOMENCLATURE	A. W1
EK_02	KNOWS THE MICROARCHITECTURE OF TISSUES, EXTRACELLULAR MATRIX AND ORGANS	AW3
EK_03	CAN EXPLAIN THE ANATOMICAL BASIS OF THE PHYSICAL EXAMINATION	A. U3
EK_04	IS ABLE TO INFER THE RELATIONSHIPS BETWEEN ANATOMICAL STRUCTURES ON THE BASIS OF ANATOMICAL DIAGNOSTIC STUDIES, ESPECIALLY IN THE FIELD OF RADIOLOGY	A. U4
EK_05	HE HAS ACQUIRED THE ABILITY TO SEE AND RECOGNIZE HIS OWN LIMITATIONS, MAKE SELF-ASSESMENT OF DEFICITS AND EDUCATIONAL NEEDS	K.05
EK_06	FORMS CONCLUSIONS FROM ITS OWN MEASUREMENTS AND OBSERVATIONS	K.08

3.3. Programme content

A. Problems of the lecture

Course contents

SEMESTER I

Lecture 1

Organization of anatomy classes. Basic anatomical terms. Practical classes, rules of participation in anatomy classes. Conditions for passing practicals, tests, practical and theoretical exams, textbooks. Basic anatomical terms; body axes, body lines, planes, body regions.

Lecture 2

Structure of bones. Joint types – classification, structure, and function. Bones of the upper limb. Upper limb joints.

Lecture 3

Division of muscle tissue. Muscles of the shoulder girdle. Axilla and axillary cavity. Blood vessels and nerves of the arm. Muscles of the arm. Shoulder and arm regions.

Lecture 4

Muscles of the forearm and hand. Cubital fossa. Blood vessels and nerves of the forearm. Muscles of the hand. Brachial plexus.

Lecture 5

Bones of the lower limb. Joints of the lower limb. Muscles of the pelvic girdle. Lumbar plexus. Sacral plexus.

Lecture 6

Muscles of the thigh. Muscles of the leg. Anatomy of the popliteal fossa. Blood supply of the lower limb. Innervation of the lower limb. Clinical aspects of foot anatomy.

Lecture 7

Muscles and fasciae of the thorax and back. Blood supply and innervation of the thoracic walls. Trachea and bronchi. Lungs. Pleura. Mediastinum. Diaphragm.

Lecture 8

Anatomy and development of the heart. Blood vessels and innervation of the heart. Pericardium. Fetal circulation. Radiological anatomy of the thorax.

Lecture 9

Muscles and triangles of the neck. Cervical plexus. Thyroid gland. Blood vessels and nerves of the neck. Larynx.

Lecture 10

Surgical anatomy of the anterior abdominal wall. Peritoneum. Stomach, duodenum, jejunum, and ileum. Large intestine.

Lecture 11
Liver, bile ducts, spleen, pancreas. Major abdominal vessels. Innervation of abdominal organs.

Lecture 12
Kidneys, ureters, urinary bladder. Lesser pelvis – topographical relations, blood vessels, and nerves. Male internal and external genital organs. Female internal and external genital organs. Lecture summary and completion.

SEMESTER II

Lecture 1
Skull – structure, basics of anthropology, connections of the skull with the spine.

Lecture 2
Oral cavity. Nose and nasal cavity. Paranasal sinuses. Hard and soft palate. Pharynx.

Lecture 3
Internal structure of the cerebral hemispheres.

Lecture 4
Anatomical structure of the brainstem.

Lecture 5
Cerebellum. Reticular formation.

Lecture 6
Spinal cord. Voluntary motor pathways.

Lecture 7
Spinal nerve. Autonomic nervous system – introduction.

Lecture 8
Autonomic nervous system.

Lecture 9
Cranial nerves – part 1.

Lecture 10
Cranial nerves – part 2.

Lecture 11
Sensory organs – ear.

Lecture 12
Sensory organs – eye.

B. Problems of exercises

Course contents
SEMESTER I – labolatory classes topics **Exercise 1**: Shoulder girdle – scapula and clavicle. Free part of the upper limb: humerus, ulna, radius, and bones of the hand (carpal, metacarpal, and phalanges). Radiographic anatomy of bones and joints of the upper limb. **Exercise 2:** Joints of the upper limb. Sternoclavicular and acromioclavicular joints – articular surfaces, capsules, ligaments, and range of motion. Shoulder joint – articular surfaces, glenoid labrum, capsule, ligaments, range of motion. Elbow joint – humeroulnar, humeroradial, and proximal radioulnar joints: articular surfaces, capsule, ligaments, and movements. Interosseous membrane of the forearm. Distal radioulnar and radiocarpal joints – articular surfaces, articular disc, and movements. Joints of the hand: intercarpal, carpometacarpal, intermetacarpal, metacarpophalangeal, and interphalangeal joints, including the saddle joint of the thumb. **Exercise 3**: Muscles of the shoulder girdle: supraspinatus, infraspinatus, teres major, teres minor, deltoid, and subscapularis – attachments, innervation, and actions. Muscles of the thorax and back attaching to the upper limb: trapezius, latissimus dorsi, levator scapulae, rhomboids, serratus anterior, pectoralis major and minor, subclavius – their influence on shoulder joint movements.Axilla and axillary fossa – boundaries and contents. Quadrangular and triangular spaces – borders and contents. **Exercise 4:** Brachial plexus – definition, formation, trunks, cords, and major branches. Short and long branches – course and areas of innervation. Regions of the arm, cutaneous nerves, and fascia of the arm. Anterior muscles of the arm: biceps brachii, coracobrachialis, brachialis – attachments, actions, innervation. Posterior muscles of the arm: triceps brachii, anconeus – attachments, actions, innervation. Musculocutaneous nerve – origin, course, branches, area of innervation. **Exercise 5**: Regions of the forearm: cutaneous innervation and superficial veins. Cubital fossa – boundaries, vessels, and nerves. Muscles of the forearm: anterior, lateral, and posterior groups – identification, attachments, actions, and innervation. Fascial compartments and intermuscular septa. Flexor and extensor retinacula. Topography of the ulnar, median, and radial nerves. Carpal tunnel and anatomical snuffbox – boundaries and contents. **Exercise 6:** Regions of the hand: cutaneous innervation. Muscles of the hand – thenar, hypothenar, and central (lumbrical and interosseous muscles): identification, actions, and innervation. Fascia and tendon sheaths of the hand. Subclavian, axillary, brachial, radial, and ulnar arteries – topography and branches. Superficial and deep palmar arches. Superficial and deep veins of the upper limb – cephalic and basilic veins. **Exercise 7**: Pelvic girdle – hip bone (ilium, ischium, pubis), acetabulum, obturator foramen, greater and lesser sciatic foramina. Pelvic spaces: muscular and vascular lacunae, pudendal canal. Free part

of the lower limb: femur, tibia, fibula, bones of the foot (tarsals, metatarsals, phalanges). Joints of the pelvis: sacroiliac joint, pubic symphysis. Joints of the lower limb: hip joint – articular surfaces, capsule, ligaments, range of motion; knee joint – surfaces, capsule, internal and external ligaments, range of motion.

Exercise 8: Tibiofibular syndesmosis and interosseous membrane of the leg. Ankle joint (talocrural joint) and subtalar joint – articular surfaces and range of motion. Transverse tarsal joint, tarsometatarsal, intermetatarsal, metatarsophalangeal, and interphalangeal joints. Mechanics and arches of the foot. Radiographic anatomy of lower limb bones and joints. Muscles of the pelvic girdle and hip region: iliopsoas, gluteal muscles, tensor fasciae latae, piriformis, obturators, gemelli, and quadratus femoris – attachments, actions, and innervation. Lumbar and gluteal fasciae.

Exercise 9: Muscles of the thigh: anterior group (sartorius, quadriceps femoris), medial group (adductor muscles, pectineus, gracilis), posterior group (biceps femoris, semitendinosus, semimembranosus) - attachments, actions, and innervation. Fascia lata, iliotibial tract, intermuscular septa. Lumbar and sacral plexuses – formation, course, branches, and innervation. Greater and lesser sciatic foramina – boundaries and contents. Femoral triangle, femoral canal and ring, adductor canal – boundaries and contents. Obturator canal and femoral hernia – anatomical relations.

Exercise 10: Cutaneous innervation of the gluteal region and thigh. Muscles of the leg: anterior group (tibialis anterior, extensor digitorum longus, extensor hallucis longus), lateral group (fibularis longus and brevis), posterior group (gastrocnemius, soleus, plantaris, popliteus, tibialis posterior, flexor digitorum longus, flexor hallucis longus). Popliteal fossa – boundaries and contents. Fascia of the leg, retinacula of extensors, flexors, and fibular muscles. Medial malleolar canal – boundaries and contents. Topography and innervation area of the tibial and common fibular nerves and their branches.

Exercise 11: Intrinsic muscles of the foot – dorsal and plantar groups. Femoral, popliteal, and tibial arteries – course and branches. Superficial and deep veins of the lower limb. Lymphatic drainage and lymph node groups. Palpation of bony landmarks, tendons, and muscles on the living subject. Pulse examination at typical sites. Functional anatomy of movements in upper and lower limb joints. Radiological and angiographic anatomy of the limbs. Articular vascular networks.

TEST 1

Exercise 12: Surroundings and orientation lines of the chest. Regions and surface landmarks of the thorax. Vertebral column – divisions, curvatures, structure of a typical vertebra, and specific features of each region. Joints and ligaments of the vertebral column, including intervertebral discs. Ribs – structure and types; sternum – morphology and articulations with ribs and vertebrae. General architecture and mechanics of the thoracic cage. Surface anatomy – palpable landmarks (jugular notch, xiphoid process, costal arch, spinous processes). Counting ribs. Radiographic anatomy of the vertebral column and thoracic cage. Muscles of the thorax – attachments, innervation, vascular supply, and actions: superficial layer (pectoralis major, pectoralis minor,

subclavius, serratus anterior), deep layer (intercostal, subcostal, and transversus thoracis muscles). Neurovascular bundle of the intercostal space. Thoracic fascia. Blood supply of the thoracic wall.

Exercise 13: Branches of the subclavian artery – internal thoracic, supreme intercostal, thoracoacromial, and lateral thoracic arteries. Parietal branches of the thoracic aorta – superior phrenic and posterior intercostal arteries. Venous drainage of the thoracic wall – azygos system and superficial thoracic veins. Innervation of the thoracic wall – intercostal nerves and supraclavicular part of the brachial plexus. Mammary gland – structure, vascular supply, innervation, lymphatic drainage, and function. Back – regions and surface landmarks. Muscles of the back – attachments, innervation, vascular supply, and actions: superficial layer (trapezius, latissimus dorsi, rhomboid major and minor, levator scapulae, serratus posterior superior and inferior), deep layer (erector spinae and suboccipital muscles). Thoracolumbar fascia and dorsal branches of thoracic spinal nerves.

Exercise 14: Ascending aorta and aortic arch – course and branches. Superior vena cava, brachiocephalic veins, and phrenic nerves – topographical relations. Pleura – definition, parts, recesses, pleural reflections, pulmonary ligament, pleural cupula. Innervation and vascular supply of the pleura. Trachea – anatomical relations, wall structure, bifurcation, differences between the right and left main bronchi. Vascular supply and innervation of the trachea.

Exercise 15: Lungs – topography, lobes, fissures, and surfaces. Root of the lung – arrangement of structures in the hilum (right and left). Bronchial tree – division and segmental anatomy. Bronchopulmonary segments. Structure of pulmonary parenchyma – pulmonary lobule and acinus. Functional (pulmonary) and nutritional (bronchial) circulation. Innervation and lymphatic drainage of the lungs. Mechanics of respiration – ventilation and gas exchange across the alveolocapillary membrane. Diaphragm – parts, openings, and contents; innervation, blood supply, and functions. Diaphragmatic hernias.
Mediastinum – definition, boundaries, divisions, and contents of superior, anterior, and posterior mediastinum. Thymus – structure, topography, and function.

Exercise 16: Heart – topographical relations within the thorax, shape, and fixation. External morphology of the heart – surfaces, borders, grooves. Structure of the heart wall and chambers. Heart valves – structure, location, and function. Projection of cardiac valves on the anterior thoracic wall and their auscultation points. Coronary circulation – course of coronary arteries, venous drainage, and vascularization of the conduction system. Innervation of the heart and effects of the autonomic nervous system on cardiac activity.

Exercise 17: Lymphatic vessels and nodes of the heart. Pericardium – structure, divisions (fibrous and serous layers, pericardial sinuses), vascular supply, innervation, and function. Thoracic aorta – course, branches, and topographical relations. Thoracic duct – origin, course, and tributaries. Lymphatic drainage and nodes of the thorax. Fetal circulation – remnants within the thoracic cavity. Thoracic part of the sympathetic trunk – topography and branches. Course and branches of the vagus nerves in the thorax. Interpretation of radiological images of thoracic organs and vessels.

Exercise 18: Neck – regions and surface landmarks. Muscles of the neck: superficial (platysma, sternocleidomastoid), middle (suprahyoid and infrahyoid muscles), deep (scalene and prevertebral muscles) – attachments, actions, vascular supply, and innervation. Cervical fascia – layers. Cervical triangles – boundaries and contents. Cervical plexus – definition, topography, branches, and areas of innervation. Posterior branches of cervical spinal nerves. Topography of the hypoglossal and accessory nerves. Cervical part of the sympathetic trunk – course and branches. Lymphatic drainage of the neck. Thyroid and parathyroid glands – structure, topography, vascular supply, innervation, and functions. Common carotid artery – origin, course, bifurcation (carotid sinus and body – innervation and function). Carotid sheath – contents and relations.

Exercise 19: Internal carotid artery – cervical course. Vagus nerve – cervical part, course, and branches. External carotid artery – course, relations, and branches: superior thyroid, lingual, facial, occipital, posterior auricular, ascending pharyngeal arteries. External jugular vein – formation, course, and tributaries. Larynx – cartilages and joints, membranes, ligaments, muscles (attachments and functions). Divisions of the laryngeal cavity: vestibule, ventricle, and infraglottic part. Vocal folds and glottis – structure and function. Innervation and blood supply of the larynx. Functional anatomy of phonation and airway protection.

TEST 2

Exercise 20: General topography of the pelvis. Pelvic and sacral bones – detailed anatomy. Sacroiliac joints and pubic symphysis – structure and functions. Ligaments of the pelvis. Greater and lesser sciatic foramina, obturator foramen. Pelvic dimensions and planes. Abdominal wall – layers and muscles: attachments, innervation, vascular supply, and functions. Aponeuroses and rectus sheath – structure above and below the arcuate line. Internal surface of the anterior abdominal wall – peritoneal folds and fossae. Inguinal canal – rings, walls, course, and contents. Areas of weakness of the abdominal wall – anatomical basis of hernias. Inguinal hernias – direct and indirect types. Surface anatomy – pelvic bony landmarks, McBurney's and Lanz points, correlation between organ position and percussion findings.

Exercise 21: Peritoneum – structure and functions. Peritoneal cavity and recesses. Omental bursa (lesser sac) – boundaries, entrance (epiploic foramen), and relations. Greater and lesser omenta. Mesenteries and peritoneal ligaments – structure and significance. Peritoneal relationships of abdominal organs – intraperitoneal, retroperitoneal, and extraperitoneal positions. Mutual topography of abdominal organs and surface projections. Digestive tract – divisions and general wall structure: mucosa, submucosa, muscular, and serous layers; innervation. Abdominal part of the esophagus – relations and blood supply. Topography of vagus nerves around the esophagus. Anatomy and functions of the stomach – regions, curvatures, internal structure, glands of the gastric mucosa, and pyloric sphincter.

Exercise 22: Duodenum – external form, internal structure, and major/minor duodenal papillae. Jejunum and ileum – location, divisions, wall structure, and functions. Arterial supply of the stomach, duodenum, jejunum, and ileum; vascular arcades and vasa recta. Meckel's diverticulum – location and clinical relevance. Large intestine – caecum, colon (ascending, transverse, descending, sigmoid), and rectum: position, peritoneal relations, blood supply, and functions. Vermiform

appendix – structure, positions, and clinical importance. Comparison between the small and large intestines (external features, mucosa, vascular architecture). Radiological anatomy of the gastrointestinal tract.

Exercise 23: Liver – location, external features, lobes, ligaments, and visceral surfaces. Microscopic structure – hepatic lobule and segments. Bile secretion and flow – intrahepatic and extrahepatic bile ducts. Gallbladder – position, structure, and function. Biliary passages – anatomic and functional sphincters. Pancreas – position, parts, duct system, histological structure, and exocrine and endocrine functions. Spleen – location, external and internal structure, ligaments, vascular supply, and functions. Abdominal aorta – course, wall layers, branches, and topography. Collateral circulation and visceral hemodynamics in the abdominal cavity.

Exercise 24: Inferior vena cava – course, wall structure, tributaries, and drainage areas. Portal circulation – formation, topography, and physiological importance. Portocaval anastomoses – esophageal, paraumbilical, rectal, and retroperitoneal pathways. Causes and consequences of portal hypertension. Anatomical communication between the superior and inferior venae cavae. Lymphatic drainage and abdominal lymph nodes. Cisterna chyli and thoracic duct. Outline of fetal circulation and its remnants in the abdomen. Autonomic nervous system of the abdomen – sympathetic and parasympathetic components and their functions in visceral regulation. Lumbar, abdominal, and pelvic parts of the sympathetic trunk. Abdominal autonomic plexuses – celiac, superior and inferior mesenteric, aortic, and hypogastric plexuses. Visceral and somatic pain patterns; referred pain and Head's zones.

Exercise 25: Kidneys – location, external features, fixation, and relations. Renal capsule and parenchyma in frontal section. Nephron – structure and function. Renal vessels and segmental vascularization. Ureters – course, structure, constrictions, and peristaltic transport. Urinary bladder – external shape, peritoneal relations, internal structure, trigone of the bladder, vascular supply, innervation, and micturition mechanism. Urethra – course and structure in males and females. Suprarenal glands – position, structure, cortex and medulla, hormones of each layer, and functions.

Exercise 26: Perineum – boundaries and divisions (urogenital and anal triangles). Pelvic diaphragm and urogenital diaphragm – muscles, fasciae, and functions. Rectum – position, wall layers, mucosal features, arterial and venous supply. Anal canal – structure and sphincters. Haemorrhoidal plexuses and their clinical importance. Internal iliac artery – parietal and visceral branches. Lumbar and sacral plexuses – formation, short and long branches. Pudendal nerve – course, branches, and area of innervation. Anatomical basis of perineal reflexes and continence mechanisms.

Exercise 27: Male reproductive organs. Testis and epididymis – structure and function. Ductus deferens – course and relations. Spermatic cord – components, coverings, and course. Prostate gland – structure, relations, and clinical anatomy. Seminal vesicles and bulbourethral glands – structure and functions. Mechanism of erection and ejaculation. Penis – external and internal structure, blood supply, and innervation. Male urethra – divisions, course, and associated glands. Scrotum – layers and contents. Sexual dimorphism and anatomical differences between the male and female pelvis.

Exercise 28: Female reproductive organs. Ovaries – location, ligaments, vascularization, and hormonal function. Uterine tubes – parts, wall structure, vascular supply, and relation to ectopic pregnancy. Uterus – position, external form, wall layers (endometrium, myometrium, perimetrium), and supporting ligaments. Cyclic changes of the endometrium. Vagina – wall layers, fornices, and relations. Vulva – labia majora and minora, vestibule, clitoris, vestibular glands, urethral opening, hymen. Female urethra – course and structure. Topography of the birth canal during vaginal examination. Anatomy of fertilization and childbirth.

TEST 3

SEMESTER II – labolatory classes topics

Exercise 1: Basic osteology of the skull: composition, shape, internal structure, and development. Identification of component bones; division into neurocranium and viscerocranium. Ontogeny of the human skull: bones formed by intramembranous and endochondral ossification. Infant skull: fontanelles, sutures, and age-related features. Cranial regions: calvaria (vault), frons (forehead), occiput, temporal region, orbit. Cranial sutures and synchondroses: coronal, sagittal, lambdoid, squamous, frontonasal, zygomaticomaxillary, palatine; landmarks pterion and asterion. Types of cranial articulations (fibrous, cartilaginous, synovial) and approximate timelines of suture closure.

Exercise 2: Synovial joints of the skull: examples with emphasis on the temporomandibular joint — movements (elevation/depression, protrusion/retrusion, lateral excursion) and mechanics. Age- and sex-related differences in skull morphology. Cranial base and principal foramina on the external and internal surfaces; clinical correlations and mechanisms of cranial base fractures.

Exercise 3: Cranial base: anterior, middle, and posterior cranial fossae — boundaries, foramina, and transmitted structures (arteries, veins, and cranial nerves). Review of individual bones and key features: occipital (basilar part, squama, lateral parts; external/internal occipital protuberances and crests; condyles; hypoglossal canal; condylar canal), parietal (parietal eminence, temporal lines, grooves for meningeal vessels and venous sinuses), temporal (squamous, tympanic, mastoid, petrous parts; zygomatic process, mandibular fossa, mastoid process, styloid process; carotid canal; stylomastoid foramen; internal acoustic meatus), sphenoid (body with sella turcica and sphenoidal sinus; greater/lesser wings; pterygoid processes; optic canal; foramen rotundum, ovale, spinosum; carotid groove), frontal (squamous and orbital parts; supra-orbital margin/notch/foramen; frontal sinus), zygomatic, maxilla (processes: frontal, zygomatic, alveolar, palatine; infra-orbital foramen; maxillary sinus), ethmoid (cribriform plate, crista galli, perpendicular plate, ethmoidal labyrinth with superior and middle nasal conchae), palatine (horizontal and perpendicular plates; greater/lesser palatine foramina).

Exercise 4: Bony boundaries and walls of the orbit and nasal cavity. Temporal fossa — contents (temporalis muscle; deep temporal nn. and vessels; zygomaticotemporal n.; auriculotemporal n.). Infratemporal fossa — contents (pterygoid muscles; pterygoid venous plexus; maxillary artery; mandibular nerve and branches; chorda tympani). Retromandibular (parotid) region — parotid gland; terminal branches of facial nerve (CN VII); branches of the external carotid artery. Paranasal pneumatisations (frontal, ethmoidal, sphenoidal, maxillary; mastoid air cells). Upper cervical vertebrae (C1–C2) and C7 — distinctive features. Craniovertebral joints: atlanto-occipital and

atlanto-axial (mechanics). Muscles of mastication: masseter, temporalis, medial and lateral pterygoids. Muscles of facial expression: scalp, palpebral, oral, nasal, auricular groups. Neck musculature: platysma, sternocleidomastoid, suprahyoid/infrahyoid, scalene, prevertebral muscles.

Exercise 5: Nasal cavity — roof, floor, lateral wall; nares and choanae; cartilages (septal, lateral, alar). Nasal conchae and meatuses; olfactory area and olfactory epithelium. Hard palate — bony components; palatal muscles and their innervation (tensor veli palatini – CN V_3; others via pharyngeal plexus/CN X). Olfactory pathway overview. Paranasal sinuses (sphenoidal, frontal, maxillary, ethmoidal cells) drainage sites and innervation. Tongue — papillae (vallate, fungiform, filiform, foliate), intrinsic and extrinsic muscles, vascular supply, somatic and special sensory innervation. Taste pathway (receptors in taste buds → geniculate / petrosal / nodose ganglia → nucleus of the solitary tract → thalamus → insular cortex).

Exercise 6: Salivary glands — parotid, submandibular, sublingual: location, ducts, functional (serous/mucous/mixed) aspects and autonomic innervation. Dentition — types of teeth (incisors, canines, premolars, molars); deciduous vs permanent dentition. Pharynx — naso-, oro-, laryngopharynx; wall structure; pharyngeal muscles and innervation (pharyngeal plexus). Waldeyer's lymphatic ring. Overview of arterial supply and venous drainage of the head and neck.

Exercise 7: Meninges of brain and spinal cord. Dural reflections: falx cerebri, tentorium cerebelli, falx cerebelli, diaphragma sellae — structure and clinical significance. Dural venous sinuses and arachnoid granulations; meningeal innervation and vascular supply. Potential spaces (epidural, subdural) and the subarachnoid space; major subarachnoid cisterns. Perivascular (Virchow–Robin) spaces. Spinal meninges and their special features.

Exercise 8: Cerebrum — lobes, principal gyri and sulci; lobe boundaries and surface landmarks. Microscopic organization of gray and white matter. Functional cortical areas (motor, sensory, association; limbic system; hippocampal formation) and core functions.

Exercise 9. Basal nuclei: caudate nucleus, putamen, globus pallidus; striatum (caudate + putamen) and lentiform nucleus (putamen + GP). Cerebral white matter: association, commissural, and projection fibers; internal capsule, external capsule, extreme capsule. Ventricular system — lateral ventricles (horns, walls), third ventricle; choroid plexus and CSF production; CSF circulation and absorption via arachnoid villi.

Exercise 10: Diencephalon: epithalamus (pineal gland), thalamus, metathalamus, subthalamus, hypothalamus. Principal thalamic nuclei and major pathways: LGN (vision), MGN (hearing), VPL/VPM (somatosensory), VL/VA (motor), anterior nuclei (limbic). Pineal gland. Melatonin.

Exercise 11: Divisions of the hypothalamus – preoptic, tuberal, and mammillary regions.
Main hypothalamic nuclei – supraoptic, paraventricular, suprachiasmatic, anterior, dorsomedial, ventromedial, arcuate, posterior, and mammillary nuclei. Functions of the hypothalamus – autonomic regulation, endocrine control, thermoregulation, water and electrolyte balance, appetite, circadian rhythms, and emotional behavior. Pituitary gland – parts and structure: anterior lobe (adenohypophysis), posterior lobe (neurohypophysis), and infundibulum. Connections

between hypothalamus and pituitary gland. Neurosecretion – production and transport of hormones from hypothalamic nuclei to the neurohypophysis. Hypothalamo–hypophyseal portal circulation – structure and function. Hormones of the anterior pituitary – adrenocorticotropic hormone, thyroid-stimulating hormone, growth hormone, follicle-stimulating hormone, luteinizing hormone, and prolactin. Third ventricle – position, boundaries, and connections with the lateral ventricles.

TEST 1

Exercise 12: External features of the brainstem; transverse sections at levels of superior/inferior colliculi, pons, and medulla (pyramidal decussation). Key structures: gracile/cuneate nuclei, internal arcuate fibers, medial lemniscus, inferior olivary nucleus, red nucleus, substantia nigra, tectum/tegmentum, cerebral aqueduct. Origins and nuclei of cranial nerves within the brainstem..

Exercise 13: Fourth ventricle — roof (cerebellum, cerebellar peduncles, tela choroidea, choroid plexus) and floor (rhomboid fossa). Subdivision of the floor into superior/inferior triangles; surface landmarks of cranial nerve nuclei.

Exercise 14: Cerebellum — vermis and hemispheres; superior and inferior surfaces. Morphological lobes: anterior, posterior, flocculonodular; cerebellar tonsils. Functional longitudinal zones: vermal, intermediate, lateral. Deep nuclei: fastigial, interposed (emboliform & globose), dentate.

Exercise 15: Cerebellar peduncles — inferior (afferents from spinal cord/medulla), middle (afferents from pontine nuclei), superior (efferents to red nucleus/thalamus). Cerebellar cortex layers: molecular, Purkinje cell, granular. Reticular formation — motor, sensory, autonomic, arousal and consciousness functions.

Exercise 16: External and internal structure of the spinal cord. Concept of funiculus, horn, and column. Gray matter – anterior, posterior, lateral, and intermediate horns; nuclei and cell groups. White matter – anterior, lateral, and posterior funiculi; organization of long ascending, long descending, and short propriospinal fibers. Interneurons – association, commissural, and projection types. Substantia gelatinosa, nucleus proprius, dorsolateral fasciculus (Lissauer tract), and dorsal nucleus (Clarke's column). Motor neurons of the anterior horns. Autonomic centers – intermediolateral nucleus (sympathetic) and intermediomedial nucleus (parasympathetic). Major ascending and descending tracts of the spinal cord. Clinical correlations – spinal shock, Brown–Séquard syndrome, syringomyelia.

Exercise 17: Descending motor tracts of the spinal cord – organization and function. Corticospinal (pyramidal) tract – origin in the precentral gyrus, course through internal capsule, decussation in the medulla oblongata, termination in anterior horn motor neurons. Corticobulbar tract – connections between the motor cortex and cranial nerve motor nuclei. Extrapyramidal tracts – vestibulospinal, reticulospinal, rubrospinal, and tectospinal pathways; roles in posture, muscle tone, and reflex control. Upper and lower motor neurons – localization and functional differences. Upper motor neuron lesion – spastic paralysis, hyperreflexia, pathological reflexes.

Lower motor neuron lesion – flaccid paralysis, muscle atrophy, loss of reflexes. Clinical correlations – stroke, traumatic injury, and motor neuron diseases.

Exercise 18: Spinal nerve – roots, trunk, and branches. Anterior (ventral) root – motor fibers. Posterior (dorsal) root – sensory fibers; spinal (dorsal root) ganglion. Mixed spinal nerve – formation and divisions. Branches of the spinal nerve – ventral branch, dorsal branch, meningeal branch, white and gray communicating rami. Gray matter of the spinal cord – anterior, posterior, lateral, and intermediate horns; nuclei and functional organization. White matter of the spinal cord – anterior, lateral, and posterior funiculi; ascending and descending tracts. Anterolateral pathway – conduction of pain, temperature, and crude touch. Dorsal column–medial lemniscus pathway – conduction of discriminative touch, vibration, and proprioception. Autonomic centers of the spinal cord – intermediolateral nucleus (sympathetic) and intermediomedial nucleus (parasympathetic).

Exercise 19: Internal carotid artery – cervical, petrous, cavernous, and cerebral parts; course and relations. Venous plexus surrounding the carotid artery in the carotid canal. Branches of the internal carotid artery – ophthalmic artery, posterior communicating artery, anterior choroidal artery, anterior cerebral artery, middle cerebral artery. Ophthalmic artery – course, branches, and areas supplied (orbit, eyelids, frontal and nasal regions, dura mater of anterior cranial fossa). General distribution of the internal carotid system – cerebral hemispheres, orbit and its contents, nasal cavity, paranasal sinuses, and meninges. Vertebral and basilar arteries – course and branches. Branches of the vertebral artery – posterior spinal artery, anterior spinal artery, posterior inferior cerebellar artery. Branches of the basilar artery – anterior inferior cerebellar artery, labyrinthine artery, pontine arteries, superior cerebellar artery, posterior cerebral artery. Cerebral arterial circle (circle of Willis) – formation, components, and significance.

Exercise 20: Venous drainage of the brain — superficial and deep cerebral veins; dural venous sinuses. Clinical correlations: ischemic vs hemorrhagic stroke, aneurysms, AVMs, epidural, subdural, and subarachnoid hemorrhage; lacunar infarcts near the internal capsule.
Overview of spinal cord blood supply and venous plexuses.

TEST 2

Exercise 21: Central control of the autonomic nervous system (limbic system, amygdala, hypothalamus, locus coeruleus, reticular formation). Functional divisions: sympathetic and parasympathetic. Sympathetic chain, cardiopulmonary and splanchnic nerves (greater, lesser, least thoracic splanchnics), celiac and other prevertebral ganglia; stellate ganglion. Parasympathetic components: cranial outflow (CN III, VII, IX, X) and sacral outflow (pelvic splanchnic nerves S_2–S_4). Parasympathetic ganglia: ciliary, pterygopalatine, submandibular, otic. Enteric nervous system — myenteric (Auerbach) and submucosal (Meissner) plexuses.

Exercise 22: Facial nerve (CN VII) motor and nervus intermedius (parasympathetic and special sensory) components. Motor supply: muscles of facial expression, stapedius, stylohyoid, posterior digastric. Branches in the face: temporal, zygomatic, buccal, marginal mandibular, cervical; posterior auricular. Parasympathetic pathways to lacrimal, submandibular, and sublingual glands

(via greater petrosal and chorda tympani). Taste from anterior two-thirds of tongue; general clinical correlations with CN V & VII

Exercise 23: Glossopharyngeal nerve – course and branches, motor, sensory, parasympathetic, Visceral afferent and special sensory fibers. Tympanic plexus – formation, location, connections with facial and sympathetic fibers. Vagus nerve – course and topography in the neck, thorax, and abdomen. Motor, Visceral afferent, Sensory and Parasympathetic fibers. Pharyngeal plexus – formation and distribution. Branches of the vagus nerve – auricular, pharyngeal, superior laryngeal (external and internal branches), recurrent laryngeal. Laryngeal nerves – motor supply to intrinsic muscles of the larynx.

Exercise 24: Trigeminal nerve (CN V) trigeminal (semilunar) ganglion; divisions and exits: V1 ophthalmic via superior orbital fissure, V2 maxillary via foramen rotundum, V3 mandibibular via foramen ovale. Motor supply (muscles of mastication, mylohyoid, anterior digastric, tensor veli palatini, tensor tympani). Sensory territories and principal named branches of V1/V2/V3 (lacrimal, frontal, nasociliary; zygomatic, infraorbital; buccal, auriculotemporal, lingual, inferior alveolar, etc.). Accessory (CN XI) origin and distribution. Hypoglossal (CN XII) motor supply to intrinsic and extrinsic tongue muscles

Exercise 25: Fibrous layer of the eyeball: sclera and cornea – structure, layers, and innervation. Conjunctiva – bulbar and palpebral parts; conjunctival sac. Eyelid apparatus – tarsal plates, tarsal glands, eyelashes, associated muscles. Vascular layer (uvea): choroid, ciliary body, iris – structure and function. Ciliary muscle and accommodation. Aqueous humor – production, circulation, absorption, and outflow pathways. Anterior and posterior chambers of the eye. Intraocular pressure and glaucoma. Lens – structure, transparency, and refractive function. Optical properties of the eye – concept of diopter and refractive power. Refractive errors – myopia, hyperopia, astigmatism; spherical and chromatic aberrations. Cataract. Retina – pigmented and neural layers, photoreceptors (rods and cones), macula lutea, fovea centralis, optic disc (blind spot). Formation of the optic nerve. Visual pathway – optic nerve, optic chiasm, optic tract, lateral geniculate nucleus, optic radiation, primary visual cortex. Motor, sensory, and autonomic innervation of the eye. Oculomotor nerve – supply to superior, inferior, and medial rectus muscles, inferior oblique, and levator palpebrae superioris; parasympathetic fibers to sphincter pupillae and ciliary muscle. Trochlear nerve – supply to superior oblique muscle. Abducens nerve – supply to lateral rectus muscle.

Exercise 26: Ear — external, middle, and inner ear. External acoustic meatus; tympanic membrane; ossicles and joints; auditory (Eustachian) tube; transmission mechanics. Inner ear: cochlea (organ of Corti; endolymph/perilymph; auditory pathway) and vestibular apparatus (utricle, saccule, semicircular canals; otolith organs; vestibular pathways). Clinical notes on hearing and balance disorders.

Exercise 27: Cervical plexus (C1–C4) — sensory branches (lesser occipital, great auricular, transverse cervical, supraclavicular), motor branches (ansa cervicalis; phrenic nerve). Posterior cervical rami: suboccipital, greater occipital, third occipital nerves. Phrenic nerve. Brachial plexus (C5–T1) — roots, trunks, divisions, cords, principal branches; supraclavicular and infraclavicular parts; topography and territories. Intercostal nerves and the thoracic neurovascular bundle; sensory supply of thoracic/abdominal walls; practical aspects of intercostal blocks/incisions.

Exercise 28: Lumbosacral plexus — lumbar plexus (L1–L4 ± T12): long branches: iliohypogastric, ilioinguinal, genitofemoral, lateral femoral cutaneous, obturator, femoral nerves; courses and territories and short branches. Sacral plexus (L4–S4): short branches to pelvic and gluteal muscles; long branches — superior/inferior gluteal, posterior femoral cutaneous, sciatic, pudendal, coccygeal nerves and short branches.
Modalities of sensation:
A) Special senses (smell, taste, vision, hearing, vestibular).
B) General — (1) proprioception; (2) exteroception (pain, temperature, itch, touch, pressure, vibration); (3) visceral sensation (including autonomic afferents essential for homeostatic regulation).

TEST 3

3.4. Didactic methods

Lecture: lectures with multimedia presentation, providing students with in-depth scientific knowledge in the field of anatomy, solving research problems

Labolatory classes: methods based on practical activities of students: practical classes in the dissection room, methods of intravital imaging of anatomical structures: X-ray, CT, NMR

Teaching aids: virtual anatomical table, anatomical models, boards, didactic films

4. METHODS AND EVALUATION CRITERIA

4.1. Methods of verification of learning outcomes

Symbol of effect	Methods of assessment of learning outcomes (Eg.: tests, oral exams, written exams, project reports, observations during classes)	Form of classes
EK_ 01	Observation during classes	prosectorial exercises
EK_ 02	Colloquium, exam	exercises, lecturs
EK_03	Colloquium, practical exam, test exam	exercises, lectures,
EK_04	Observation during classes, colloquium, test exam	exercises, lectures, seminars
EK_05	Colloquium, exam	exercises, lectures,
EK_06	Observation during the course of the prosector classes, colloquium, exam	exercises, lectures,
EK_07	Colloquium, practical exam	exercises

EK_08	Observation during the course of the prosector classes, practical exam, test exam	exercises, lectures, seminars

4.2. Conditions for completing the course (evaluation criteria)

Lectures

The condition of passing the course is to achieve all the results of the training, in particular, to lectures - written test (MCQ test), verified learning outcomes: EK_02, EK_03, EK_04, EK_06,

Labolatory classes

The condition for passing the exercises is attendance at classes and obtaining credits for the winter and summer semesters. Student absences due to illness should be documented with an applicable sick leave. Absences should be excused immediately after the cause has subsided, i.e. during the first class after the period of absence. Unexcused absences from classes are treated as failed exercises. Failure to make up exercises prevents taking the colloquium. Unexcused absences result in failing the semester. In unforeseen situations, the decision regarding the possibility of passing is made by the Head of the Department. A necessary condition for passing the semester is a positive result of 3 colloquia in the form of tests, ending the cycle of exercises. Each credit will include 30 single or multiple choice test questions. In order to pass the semester, no less than 60% of points must be obtained from each test. A negative result of passing the cycle of exercises can be corrected once within 2 weeks after the first date in the form of a test. For each colloquium, there is only one retake date. In the event of a lack of a positive assessment, after obtaining the Dean's consent, the student will pass the entire semester in a committee. Verified learning outcomes EK_01- EK_08,

Final exam

The condition for admitting a student to the exam is a positive result of all 6 mid-semester tests, attendance at classes and passing the semester test from lectures in the winter semester. **A negative result in passing any thematic block results in not admitting the student to the final exam.**

The final exam consists of a **practical and theoretical part**. The condition for admitting to the theoretical exam is a positive result of the practical exam. In the practical exam, the marked anatomical structures must be recognized. Giving the correct answer within 30 seconds consists of providing the correct English name (in accordance with the current anatomical nomenclature). Students who fail the practical component twice are not eligible for the commission examination, which results in failure of the entire academic year.

1 point - the student receives for correctly providing the Polish/English name and the correct definition of the right or left side.

0.5 points – for an incompletely correct Polish/English name or a missing/error in specifying the page

0 points – for an incorrect Polish/English name

For correctly describing 1 structure (1 pin), the student can receive a maximum of 2 points (1 point for the correct Polish name and 1 point for the correct English name). **Obtaining at least 60% of the possible points means a positive result in this part of the exam.**

The theoretical exam (MCQ type test), verifying the learning outcomes, consists of 100 single- or multiple-choice questions covering all the material included in the subject program. To pass the

theoretical exam, you must **obtain 60%** of the possible points from the test. **A student who failed the practical exam cannot take the theoretical exam, receiving an insufficient grade on the first attempt.**

Any comments regarding the test, including the correctness of the questions, can only be submitted during the test by raising your hand and reporting the question/problem to one of the people conducting the exam. Substantive comments on the content of the questions are submitted in writing during the test on a special sheet. The submitted comments are considered by the subject coordinator and the teachers.

If a substantive error in a question is confirmed, the question is canceled and the percentage thresholds listed below are calculated in relation to the new number of questions.

Unexcused absence from the final test results in receiving an insufficient grade. Absence from the exam can only be excused by a rector's/dean's or doctor's note submitted within 3 days from the date of the final test to the Dean's Office and the Department of Histology and Embryology. Failure to submit a note within this period results in receiving an insufficient grade.

Knowledge assessment, verified learning outcomes:
Written test
5.0 - has knowledge of each of the contents of education at the level of 90% -100%
4.5 - has knowledge of each of the content of education at the level of 84% -89%
4.0 - has knowledge of each of the content of education at the level of 77% -83%
3.5 - has knowledge of each of the content of education at the level of 70% -76%
3.0 - has knowledge of each of the content of education at the level of 60% -69%
2.0 - has knowledge of each of the contents of education below 60%

Assessment of skills, verified learning outcomes:
5.0 - the student actively participates in classes, recognizes and is able to correctly name individual anatomical units on phantoms and in the human body; can relate knowledge of the detailed human anatomy, especially in the area of the musculoskeletal system and the nervous system with the function and tasks of individual organs.
4.5 - the student actively participates in the classes, with little help from the teacher he recognizes and is able to properly name individual anatomical units on phantoms and in the human body; can relate knowledge of the detailed human anatomy, especially in the area of the musculoskeletal system and the nervous system with the function and tasks of individual organs.
4.0 - the student actively participates in classes, with minor corrections of the teacher, commits minor mistakes, recognizes and is able to properly name individual anatomical units on phantoms and in the human body; can relate knowledge of the detailed human anatomy, especially in the area of the musculoskeletal system and the nervous system with the function and tasks of individual organs.

3.5 - the student participates in activities with corrections and teacher's instructions recognizes and is able to properly name individual anatomical units on phantoms and in the human body; can relate knowledge of the detailed human anatomy, especially in the area of the musculoskeletal system and the nervous system with the function and tasks of individual organs.
3.0 - the student participates in classes, with numerous corrections and instructions from the teacher, but commits minor mistakes and recognizes and correctly names individual anatomical units on phantoms and in the human body; can relate knowledge of the detailed human anatomy, especially in the area of the musculoskeletal system and the nervous system with the function and tasks of individual organs.
2.0 - the student passively participates in classes, commits blatant errors in the diagnosis and proper naming of anatomical units, and can not link knowledge of the detailed human anatomical structure with

the function and tasks of individual organs. Knowledge evaluation, verified learning outcomes: EK_01-EK_05 Assessment of skills, verified learning outcomes: EK_06-EK_08

5. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES IN HOURS AND ECTS CREDITS

Activity	Hours / student work
Hours of classes according to plan with the teacher	170
Participation in the consultations, exams	5
Preparation for tests	270
SUM OF HOURS	445
TOTAL NUMBER OF ECTS	**13**

6. TRAINING PRACTICES IN THE SUBJECT / MODUL

Number of hours	-
Rules and forms of apprenticeship	-

7. LITERATURE

Obligatory sources:

1.**Text book of Anatomy: Volume I-III, 2e** Vishram Singh; 2014 Reed Elsevier India Private Limited

2. **Gray's Anatomy for Students**. R.L. Drake, A.W. Vogl, W.M. Mitchell

3.Basic Clinical Neuroscience. P.A.Young, P.H. Young, D. Tolbert

4.Atlas of Human Anatomy. Frank H. Netter

Additional sources for self-studying:

1. Clinically Oriented Anatomy. K.I.Moore, A.F. Dalley

Approved by the Head of the Department or an authorised person