

ODESSA NATIONAL MEDICAL UNIVERSITY  
Pharmaceutical faculty,  
Department of Normal and Pathological Clinical Anatomy

**SYLLABUS OF ACADEMIC DISCIPLINE**  
**«HUMAN ANATOMY»**

<b>Course scope</b>	Total hours/credits – 60 hours / 2 credits
<b>Semester, year of study</b>	First year of university: II semester
<b>Days, time, location</b>	According to the schedule. Practical and seminars classes are held in the 1st and 2nd anatomy halls, as well as in the academic rooms of the department, according to the schedule of classes.
<b>Teachers</b>	1. Appelhans Elena, Head of the Department, Professor, PHD 2. Nescoromna Natalia, Associate Professor, PhD. 3. Matiushenko Phylyp, senior teacher 4. Kuznyetsova Elena, senior teacher 5. Chebotarova Svetlana, senior teacher 6. Antonova Natalya, senior teacher 7. Kozhukharenko Tatiana, assistant 8. Ursu Alexandr, assistant 9. Ostapenko Andrey, assistant 10. Prus Ruslan, assistant, PhD 11. Kozachenko Anastasia, assistant .
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<b>Teacher's workplace</b>	<p>1. Nescoromna Natalia – anatomy hall N 2</p> <p>3. Matiushenko Phylyp – study room N 3</p> <p>4. Kuznyetsova Elena – study room N 1</p> <p>5. Chebotarova Svetlana - anatomy hall N 2</p> <p>6. Antonova Natalya - anatomy hall N 1</p> <p>7. Kozhukharenko Tatiana - study room N 1</p> <p>8. Ursu Alexandr - anatomy hall N 1</p> <p>9. Ostapenko Andrey - anatomy hall N 2</p> <p>10. Prus Ruslan - study room N 2</p> <p>11. Kozachenko Anastasia study room N 2</p>
<b>Counseling for students</b>	<p>Tuesday, Thursday - 14.30 - 17.30.</p> <p>Conducted by the teacher on duty according to the duty schedule. During the quarantine period - on-line Zoom.</p>

**The communication is done:** with help of E-mail of the department: [anatomy@onmedu.edu.ua](mailto:anatomy@onmedu.edu.ua), as well as for additional messengers **Viber** and **Telegram**, as well as [www.anatom.in.ua](http://www.anatom.in.ua), <https://anatom.ua>/<https://meduniver.com> / **Medical / Anatom**

## **COURSE ANOTATION**

The study of the discipline "Human Anatomy" for pharmacists is an adapted to the needs of medicine classic model of the university course. It provides for each student to acquire knowledge about the structure and functions of the human body and the ability to use the acquired knowledge in the further study of other fundamental sciences of medicine, and in the practical activities of the doctor. Subject of study of the discipline "human anatomy": the science of the form, structure, origin and development of organs, systems and the human body as a whole.

### ***Interdisciplinary connections:***

Human anatomy as an academic discipline:

(a) builds upon students' study of medical biology, histology, cytology and embryology, biophysics, Latin, ethics, philosophy, and ecology and integrates with these disciplines;

b) lays the foundation for students to study normal and pathological physiology, pathological anatomy, operative surgery and topographic anatomy, deontology, propaedeutics of clinical disciplines and the formation of skills to apply knowledge of human anatomy in the further study of all clinical disciplines and in future professional activity.

### ***Aims and Purposes of the Study of Human Anatomy***

The purpose of the study of human anatomy provides for each student to acquire knowledge of anatomy in the world of natural science ideas about the structure and functions of organisms and the human body as a whole, the ability to use the acquired knowledge in the further study of other fundamental sciences of medicine, and in the practical activities of the pharmacist.

An important form of training students is an independent work, which provides the assimilation of knowledge about the peculiarities of the structure and form of organs and tissues of a person, the assessment of sexual, age, individual features, topographo - anatomical relationship of organs and human systems, the laws of organ development, variability and malformation of development.

The study of the discipline "Human Anatomy" requires students to work independently with textbooks and manuals, the use of the Atlas of Human Anatomy, reference books and materials of periodic scientific publications.

### ***The ultimate goals of the discipline:***

- Analyze information about the structure of the human body, systems, its components, organs and tissues;

- Determine the topographoanatomical relationship of human organs and systems;
- Interpret patterns of prenatal and early postnatal development of human organs, variants of organ variability, malformations;
- Interpret sex, age and individual features of the structure of the human body;
- Provide for interdependence and unity of structures and functions of human organs, their variability under the influence of ecological factors;
- Identify the influence of social conditions and work on the development and structure of the human body;
- Demonstrate mastery of moral and ethical principles of the attitude to the living person and his/her body as an object of anatomical and clinical study.

***The main objectives of the discipline***

"Human anatomy as a science is a systematic approach to the description of shape, structure of organs, position (topography) of body parts and organs in unity with performed functions taking into account age, sex and individual peculiarities of a person; study of functions of separate organs, systems and the whole body; study of nervous and endocrine regulation of the body, its organs and systems; form practical skills of determination and evaluation of functional features of the body; expand the idea of the role of studying human anatomy.

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Analyze information about the structure of the human body, systems, its components, organs and tissues;

***Learning outcomes for the discipline*** (integral final program learning outcomes to which the discipline contributes)

#### **Know:**

- The shape and structure of organs combined into systems: the shape and structure of the bones (systema skeletale), joints of bones (systema articulare), muscles (systema musculare), viscera (systema digestorium, respiratorium, urinarium, genitalia), central and peripheral nervous system (including the autonomous division of the peripheral nervous system (systema nervorum)
- Organs of internal secretion (glandulae endocrinae)
- The organs and formations of the immune system;
- The lymphoid system (systema lymphoideum)
- Sense organs (systema sensuum)
- Integumentum commune
- Cardiovascular system (systema cardiovasculare)

#### **Be able to:**

- demonstrate and describe the anatomical structure of human organs, organ systems;
- identify anatomical relationships of human organs and organ systems on anatomical preparations (organ topography);
- evaluate the influence of social and working conditions on the development and structure of the human body

- apply Latin anatomical terms and their Ukrainian equivalents according to the requirements of the international anatomical nomenclature (São Paulo, 1997; Kiev, 2001);

## COURSE DESCRIPTION

Forms and methods of teaching:

The course will be presented in the form of lectures (10 hours - full-time form, 4:00 - part-time), practical (30 hours - full-time, 8:00 - part-time) classes and the organization of the students' independent work (20 hours - full-time, 78 hours - part-time)

Topics of the lecture course reveal the problematic issues of the relevant sections of human anatomy.

Practical classes include:

- mastering by students the structure and topography of organs, systems of human organs;
- Identification of human organs and systems on anatomical specimens;
- Acquiring Latin terminology in accordance with the requirements of the international anatomical nomenclature (Sao Paulo, 1997);

The assimilation of the topic is controlled in the practical classes in accordance with the specific objectives.

### Contents of topics:

- Musculoskeletal system;
- spleenology;
- Central nervous system, sensory organs, cranial nerves;
- Cardiovascular system; head and neck vessels;
- Peripheral nervous system; Vessels and nerves of the trunk and extremities.

## PROGRAM CONTENT

***Theme 1: Introduction to the department. Rules of the internal order. The content of the discipline, types of anatomy. Methods of studying anatomy, clinical significance. Parts, axes, planes of the human body. Acquaintance with the age, sex, individual features of the structure of the organs of the human body. The concept of the norm, variants, anomalies.***

Anatomy of the musculoskeletal system. The content of the discipline, types of anatomy. Methods of studying anatomy, clinical significance. Parts, axes, planes of the human body. Acquaintance with age, sex, individual features of the structure of the organs of the human body. The concept of the norm, variants, anomalies.

Human anatomy is the science of form and structure, origin and development of the human body, its organs and systems. Anatomy provides a systematic description of the form, structure, state and topographic relationships of body parts and organs, taking into account their age, sex and individual characteristics. The main modern trends of anatomy development are age-related anatomy, comparative anatomy, plastic anatomy, anthropology, ecological anatomy, etc.

The main methods of research in anatomy - visual examination, anthropometric studies, dissection, macro-microscopic studies, microscopic studies. Modern methods of research in anatomy: X-ray anatomical methods, computed tomography, magnetic resonance imaging (MRI), ultrasound (USI), endoscopy, etc.

**Topic 2: *Bones of the skeleton. Bone as an organ, bone development, classification of bones, bone structure. Arthrosyndesmology, an overview of the connection of the bones of the skeleton. Classification of bone connection, biomechanics of joints.***

Bones of the skeleton: vertebrae, ribs, sternum. Principle of segmentarity in the structure of the axial skeleton. Brief information about the phylo- and ontogenesis of the vertebral column. General characteristic of the vertebral column. General plan of the structure of the vertebrae. Features of the structure of the cervical, thoracic, lumbar vertebrae, sacrum bone, coccygeal bone. Age and sex peculiarities of the structure of the vertebrae. Influence of social and environmental factors on the structure of the vertebrae. Vertebral malformations. Development of the ribs and sternum in phylo- and ontogenesis. Classification of the ribs. Structure of the ribs and sternum. Forms of variability of ribs and sternum, variants and anomalies of development. Age and sex peculiarities of the structure of the sternum. The influence of social and environmental factors on the structure of the ribs and sternum.

The bones of the upper extremity: the departments. The belt of the upper extremity: clavicle, scapula; their structure. Free part of the upper extremity: humerus, bones of the forearm and hand, sesamoid bone their structure. Terms of ossification of the bones of the upper extremity. Bones of the lower extremity: sections. The girdle of the lower extremity: the hipbone; its structure. Parts of the acetabular bone, their structure. Free part of the lower extremity: femur, tibia, foot bones; their structure. Timing of ossification of the bones of the lower extremity. Homology of the bones of the upper and lower extremities. Age, sex peculiarities of the structure of the bones of the limbs. Development of connections between bones in phylo- and ontogenesis. Classification of connections between bones. Types of synarthroses: connection by

means of connective tissue (syndesmoses) - membranes, connections, sutures, themes; connection by means of cartilage tissue (synchondroses) - permanent, temporary, hyaline, fibrous; connection by means of bone tissue (synostosis). Napiyvererivnye zyednannya-symphysis. Diarthroses (synovial joints, joints): definition, the main features of the joint, their characteristics. Additional components of joints. Classification of joints by structure, form of articular surfaces, by function. Simple, complex, complex and combined joints: their characteristics. Types of movements and their analysis (axes of movement, planes of movement). Uniaxial, biaxial and multiaxial joints, their types, characteristics of movements in each type of joint.

Classification of joints of the spinal column. Syndesmoses of the spinal column: their characteristic and structure. Synchondroses of the spinal column: their characteristic and structure. Joints of the spinal column: medial atlanto-axial joint, lateral atlanto-axial joint, arcovisceral joint, lumbosacral joint, sacroiliac joint: their structure. Joints of the thorax: syndesmoses, synchondroses and joints (rib-vertebral joints, rib-transverse joints, sterno-costal joints): their characteristic and structure. The thorax as a whole.

Connection of the upper extremity. Connection between the bones of the belt of the upper extremity: the syndesmoses of the belt of the upper extremity and the joints of the belt of the upper extremity, their structure. Connection between the bones of the free upper extremity.

Connection of the lower extremity. Connection of the pelvic girdle: syndesmoses, pubic symphysis, sacroiliac joint. Pelvis as a whole: its structure, main dimensions. Age, sex, individual features of the pelvis. Connection between the bones of the free lower extremity.

### **Topic 3: *Skull Bones. Skull of the newborn, individual and sexual features of the skull, criticism of racist theories.***

Development of the skull in phylo- and ontogenesis. Cerebral and facial sections of the skull. Structure of bones that form the cerebral skull: frontal, occipital, parietal, wedge-shaped, temporal, lattice. Structure of the bones that form the facial skull: the lower jaw, upper jaw, zygomatic, nasal, palatine, lacrimal, hyoid bones, cecum, lower nasal concha. Vault of skull, external and internal base of skull. Anterior, middle and posterior cranial fossae, eye socket, bony nasal cavity, temporal, subisternal, wing-frontal fossa. Age and sex peculiarities of the skull structure. Variants and anomalies in the development of the bones of the skull. X-ray anatomy. Connections between the bones of the skull: classification. Syndesmoses of the skull: sutures, their types and characteristics. Synchondroses of the skull: their types, characteristics, age features. Joints of the skull: temporomandibular joint and atlanto-occipital joint: their



structure. Age-related features of the cranial joints: the fontanel, their types, structure, ossification terms.

**Topic 4. *Muscles of the trunk. Structure, classification, auxiliary apparatus, function of the muscles. Muscles of the extremities. Structure, classification, accessory apparatus, muscle function.***

Muscle as an organ - definition. Tendons, aponeurosis. Auxiliary apparatus of muscles: fasciae, synovial sheaths, synovial pouches, sesamoid bones, tendon arches, muscle block. Anatomical and physiological cross-section of muscles: basic data on muscle strength and work; the concept of leverage. Initiation and attachment of muscles: their functional characteristic. Classification of muscles: by development, topography, shape, size, direction of muscle fibers, function, etc.

Muscles and fascia of the head: classification. Chewing muscles, their characteristic. Muscles of the neck: classification. Superficial, middle and deep muscles of the neck, their characteristic. Fascia of the neck, topography: anatomical classification. Classification of the muscles of the trunk with topography, development and form. Segmentary structure of the muscles of the trunk. Back muscles: superficial and deep, their characteristic. Thoracolumbar fascia. Muscles and fascia of the thorax: superficial and deep, their characteristic.

Abdominal muscles and fascia: muscles of the anterior, lateral and posterior walls of the abdomen, their characteristic. The white line. Umbilical ring. Abdominal abs. Topography of sections of abdomen. Groin canal. Vagina of the rectus abdominis muscle. Diaphragm - definition.

Muscles of the upper extremity: classification. The muscles of the girdle of the upper extremity, their characteristic. Shoulder muscles: classification, their characteristic. Muscles of the forearm: classification, their characteristic. Hand muscles: classification, their characteristic. Fascia of the upper extremity. Topography of the upper extremity Muscles of the lower extremity: classification. Muscles of the lower limb girdle: classification, their characteristic. Thigh muscles: classification, their characteristic. Muscles of the lower leg: classification, their characteristics. Foot muscles: classification, their characteristic. Fascia and topography of the lower extremity.

Age, sex and individual characteristics of skeletal muscles. Influence of sport, labor, social factors and environmental factors on the structure of skeletal muscles.

**Topic 5: *The digestive system. Oral organs. Pharynx. Esophagus, stomach, intestines, liver, pancreas. Peritoneum.***

Classification of internal organs: tubular and parenchymatous. General plan of the structure of the wall of the tubular organs: mucous membrane, muscular membrane, outer membrane. Characteristics of each shell. Organ-specific features of the structure of the mucous membrane depending on the function of the organ. Serous membrane: variants of relation of organs to peritoneum. General regularities of the structure of parenchymatous organs. Glands their classification, general principles of structure, functions.

Digestive system: organs, functions. The development of the oral cavity and its derivatives. The development of the organs of the digestive tract. The development of the liver and pancreas. Primary and secondary body cavities. Sources of development of the serous membranes. Development of the peritoneum. Structural mechanisms of malformations of the oral cavity and its derivatives. Anomalies and variants of development of the organs of the digestive tract, liver, pancreas.

Oral cavity: its parts. Walls of the vestibule of the mouth and the oral cavity proper, their communications. Teeth. Parts of the tooth. The surfaces of the crown. The general structure of the teeth. Periodontium, periodontium. The gums. Permanent teeth: their formula, characteristics of each type of teeth. Timing of eruption of permanent teeth. Baby teeth: formula, peculiarities of structure, terms of eruption. Palate: hard palate, soft palate, their structure. The tonsils. Tongue: parts. Features of the structure of the mucous membrane, the muscles of the tongue. Mouth glands: classification, their development.

The pharynx, its topography, parts, connections. The pharynx, its limits. Lymphatic (lymphoid) ring of the pharynx. Structure of the pharyngeal wall.

Esophagus: topography, parts, structure of the wall. Narrowing of the esophagus. X-ray anatomy of the esophagus. Stomach: topography, parts of stomach. Structure of the stomach wall: peculiarities of the structure of the mucous membrane (relief, glands), muscular shell and serous membrane. Small intestine, its sections.

Duodenum: parts, topography, variants of its shape and position. X-ray anatomy of duodenum. Topography of the mesenteric part of the small intestine empty and ileum. Structure of the wall of the small intestine. Large intestine: sections. Structure of the wall of the large intestine mucosa (glands, folds, lymphoid (lymphoid) nodules), muscular shell, serous membrane. Relation to the peritoneum of each department of the large intestine. Macroscopic changes in the structure of the small and large intestine. Age peculiarities of the structure of the large intestine.

Liver. Topography. External structure: edges, surfaces and their relief. Connections of the liver. Relationship to peritoneum. Internal structure of the liver - lobes, segments, lobules. Vessels of the liver. Functions of the liver. Ways of bile secretion.

Gall bladder: topography, parts, structure of the wall, functions. Pancreas: parts, topography, structure, functions. Pancreatic ducts. The pancreatic islets.

Peritoneum. The abdominal cavity, its contents. Peritoneal cavity, its contents. Peritoneal peritoneum, internal peritoneum: their characteristic. Variants of the relation of internal organs to the peritoneum. Derivatives of peritoneum: ruffle, chepse, ties, their structure and functions. Derivatives of the peritoneal cavity: pouches (hepatic, pre-stomach, omentum - their walls, communications), sinuses, canals, corners, fossae.

### **Topic 6: *Respiratory system. Pleurae.***

Respiratory system: organs, functions. Upper and lower respiratory tracts. Development of the respiratory system organs in phylo- and ontogenesis. Variants and abnormalities of development of the respiratory system.

External nose: parts, structure. Nasal cavity: anteriors, nasal passages, paranasal sinuses. Functional parts of the nasal cavity. Nasal part of the pharynx. Larynx. Topography. Structure of the larynx: cartilage, ligaments, joints, muscles. Laryngeal cavity: parts, their boundaries. The vocal folds, the vestibule folds. The vocal cleft. Mechanisms of vocalization. Trachea: parts, topography, structure of the wall. Main bronchi: topography, structure of the wall. The bronchial tree. Age features.

Lungs: topography, external structure. Lung gates. Root of the lungs and its components. Lobes, segments, lobules of the lungs. Acinus. Circulatory system of the lungs. X-ray anatomy of trachea, bronchi, lungs. Age features of the lungs. Pleurae. The mediastinum: definition, boundaries. Organs of the anterior and posterior mediastinum.

### **Topic 7: *Heart, mediastinum, pericardium. Vessels and nerves of the heart. The great and small circulatory circle.***

Topography of the heart. Shape, position of the heart. External structure of the heart. Chambers of the heart: their structure. Valves of the heart. Structure of the heart wall: endocardium, myocardium, epicardium. Leading system of the heart. Arteries and veins of the heart. The cardiac cavity, its structure, the cavity of the heart, the contents, the sinuses. Projection of the boundaries of the heart and valves on the anterior wall of the chest. Age anatomy of the heart. The great circle and the small circle of circulation. Blood circulation of the fetus.

Development of the heart in phylogeny. Stages of heart development in human embryogenesis. Variants and abnormalities of heart development. Structural mechanisms of cardiac abnormalities.

## **Topic 8: *Urinary system. Sexual male system. Female genital system.***

Urinary system: organs, functions. Development of the urinary system organs in phylo- and ontogenesis. Variants and abnormalities in the development of the organs of the urinary system: kidneys, ureters, bladder and urethra.

Kidney: topography of the right and left kidney. External structure. Relation of the kidney to the peritoneum. The membranes of the kidney. The fixation apparatus of the kidney. Topography of the elements of the renal pedicle. Internal structure of the kidney. Nephron. Structure of the circulatory system of the kidney. The ureter: parts, topography, structure of the wall, function. Constriction of the ureter.

Bladder: shape, external structure, parts. Features of topography in men and women. Structure of the bladder wall.

Male genital system: organs, functions. Internal male genital organs. External male genital organs. Development of the male genital system organs in phylo- and ontogenesis. Variants and anomalies in the development of the internal male genital organs intersexual.

The internal male genital organs. Testicle: topography, structure. The testicle. The process of descending testicle. Testicular membranes. Seminal duct: parts of its topography, structure of the wall. Seminal cord, its components. Seminal vesicle of the vas deferens. The prostatic gland. Onion and cecum gland.

External male genitalia. Calyx. Penis, its structure. Male urethra: parts, their topography, structure of the wall.

Female genital system: organs, functions. Classification of organs of the female genital system. Internal female genital organs. External female genital organs. Ovary: topography, external structure, internal structure, ligaments of the ovary, relationship to the peritoneum, functions. Cyclic changes in the structure of the ovary. Age features. Uterine tube. Uterus. Vagina. X-ray anatomy of the internal female genitalia. External female genital organs. Female urethra. Perineum: definition, topography. Urogenital diaphragm: boundaries, muscles, fasciae, sex differences. Pelvic diaphragm.

## **Theme 9: *Endocrine system organs, organs and elements of the immune system.***

Immune system: functions. Classification of organs of the immune (lymphatic or lymphoid) system with function. Central organs of the immune system (primary lymphatic or lymphoid organs): bone marrow, gland (thymus) - structural patterns of their functions.

Peripheral organs of immune system (secondary lymphatic or lymphoid organs) - structural patterns of their functions.

Central organs of the immune system (primary lymphatic or lymphoid organs). Red bone marrow. Yellow bone marrow. Topography, structure, functions. Age features of bone marrow. The thymus gland (thymus).

Peripheral organs of the immune system (secondary lymphatic or lymphoid organs). Spleen. Lymphatic (lymphoid) ring of the pharynx: tonsils, it is formed by lymph nodes and. Solitary lymphatic (lymphoid) nodules: crowded lymphatic (lymphoid) nodules: topography, structure, functions. The pinched lymphoid (lymphoid) nodules of the worm appendix: topography, structure, and functions.

General principles of the structure of endocrine organs. Structural definition of the concept of "endocrine function". Structural mechanisms of realization of the action of hormones. Classification of endocrine organs.

Thyroid gland: topography, structure, functions. Parathyroid glands: topography, structure, functions. Adrenal glands: structure and functions. Topography of the right and left adrenal glands. Endocrine part of the pancreas: structure, functions. Pituitary gland: topography, parts, structure, functions. Pineal gland: topography, structure, functions.

### **Topic 10. *The central nervous system. The brain and spinal cord.***

The leading role of the nervous system in the body its importance for the integration of organs, systems of organs into a single coherent organism, in establishing the relationship of the body with the external environment. Classification of the nervous system by topographic principle (into the central nervous system and peripheral nervous system) and by anatomical-functional principle (into somatic nervous system and vegetative nervous system). The general principle of neuron structure.

Morphological and functional classification of neurons. Receptors, their classification. General plan of synapses structure. Reflexive arcs. Gray matter of CNS. Neuroglia. Principles of spatial organization of the CNS gray matter. Nerve knots. White matter of CNS.

Stages of development of the nervous system in phylogeny. The development of the nervous system in ontogenesis. Development of the spinal cord in embryogenesis. Development of the brain in embryogenesis: stage three and five cerebral vesicles and their derivatives. Anomalies in the development of the spinal cord and brain.

Topography of the spinal cord, its limits. The external structure of the spinal cord. Relationship between vertebrae and spinal cord segments (Schipo's rule). Internal structure of the spinal cord: central canal, gray and white matter. Structure of

posterior, lateral and anterior horns of spinal cord. White matter: classification. Structure of the anterior, lateral and posterior tubules of the spinal cord.

The cerebrum. Divisions of the brain: large brain, cerebellum, brain stem. Classification of divisions of the brain with development. Derivatives of the rhomboid brain: medulla oblongata and hindbrain (bridge and cerebellum).

The medulla oblongata: boundaries, external structure. Internal structure: gray and white matter. Bridge: external structure. Internal structure: gray and white matter. Cerebellum: topography, external structure. Internal structure. The composition of the cerebellar peduncles.

Rhomboid fossa: formation, borders, relief. Projection of the nuclei of cranial nerves on the surface of the rhomboidal fossa. Fourth ventricle: walls, communications.

Midbrain, its parts. Roof plate: external structure; internal structure: gray and white matter. Cerebral pedicles, internal structure. The cerebral aqueduct.

Derivatives of forebrain: intermediate brain, terminal brain.

Intermediate brain: parts (dorsal part - thalamic brain; ventral part - hypothalamus). Parts of thalamic brain: thalamus, epithalamus, metathalamus.

Terminal brain: hemispheres of large brain. Corn corpus callosum, arches, anterior commissure. Olfactory brain: parts, their components. Basal nuclei: topography, parts, functions. Cloak. The cerebral cortex: CITO and myeloarchitectonics of the cortex. The works of V.O. Betz. Relief of the cerebral hemispheres: furrows and convolutions. Morphological basis of dynamic localization of functions in the cerebral hemispheres cortex. White matter of hemispheres: classification. Associative fibers: classification, functions. Commissural fibers and their functions. Projective fibers: classification. Internal capsule: parts, topography of conductive pathways in each part. Lateral ventricles: parts, their topography, walls, connections. Conduction pathways - definition. The membranes of the spinal cord. The mizoboloncular spaces and their contents. The membranes of the brain.

Topic 11. Sense organs.

Anatomical and functional characteristics of the sense organs. Peripheral perceived, conductive and cortical centers of analyzers, their functional unity. The olfactory organ. Olfactory part of the nasal mucosa. Conductive pathways of olfactory analyzer. The organ of taste. Taste papillae of tongue, their topography. Pathways of the taste analyzer. General covering. Skin: functions. Varieties of skin sensitivity. Mammary gland.

Eyeball. The membranes of the eyeball: fibrous, vascular, internal (retina) - their structure. The chambers of the eyeball: anterior, posterior, and their walls. The vitreous body, the lens. Aqueous humour: place of formation, ways of outflow. The accommodative apparatus of the eye. Additional structures of the eye.

The ear. Phylo and ontogenesis. Parts of the ear: outer, middle and inner ear. Outer ear: parts, their structure. Middle ear: parts. Eardrum: walls, contents. Combination of the tympanic cavity. Auditory tube: parts, structure. Inner ear, parts, topography. Bony labyrinth: vestibule, semicircular canals, cochlea, their structure. The membranous labyrinth: vestibular labyrinth, semicircular ducts, cochlear duct, their structure. Mechanism of perception and pathways of sound conduction. Conduction pathways of hearing and equilibrium.

### **Topic 12. *Cranial nerves. Vessels of the head and neck.***

General characteristics of cranial nerves. Common features and differences in the structure of cranial and spinal nerves. Classification of cranial nerves by function (motor, sensory, mixed). Classification of cranial nerves by origin. Development of cranial nerves in relation to the sensory organs (I, II, VIII pair), the myotomes of the main somites (III, IV, VI, XII pairs), and the gill arches (V, VII, IX, X, XI pair). Differences in the structure of the cranial nerves derived from the brain (I, II pair) from the rest of the cranial nerves. The general plan of the structure of the motor, sensitive and mixed cranial nerves. General plan of the structure of the vegetative nodes of the head: roots and branches.

Anatomy of cranial nerves: nuclei, their localization, exit of the nerve from the brain, from the skull, nerve branches, the composition of their fibers, topography, innervation areas. Autonomic nodes of the head (wing-palatinal, ciliary, submandibular, hyoid, auricular): their roots and branches, areas of innervation.

Internal jugular vein: formation, topography, classification of tributaries. Intracranial tributaries, extracranial tributaries of the internal jugular vein. Anastomoses between the intracranial and extracranial tributaries of the internal jugular vein. External jugular vein: formation, topography, tributaries. Anterior jugular vein: formation, topography, tributaries. Jugular venous arch: topography, formation.

### **Topic 13. *Nerves of the thoracic, abdominal, pelvic cavities and their walls. Vessels of the thoracic, abdominal, pelvic cavities and their walls.***

Anatomical classification of arteries (anterior, main, extraorganic, intraorganic). Classification of arteries by wall structure. Types of arterial branching. Main regularities of arteries distribution in human body. Arterial intersystem and intrasystem anastomoses. Sources and mechanisms of arteries development. Arterial arcs and their derivatives. Variants and abnormalities of main arteries development.

Vessels of hemocirculatory bed, structure of their walls and functions. Sources and mechanisms of formation of vessels of hemocirculatory bed. Organ specificity of blood vessels of hemocirculatory bed. The concept of collateral (bypass) ways of blood flow. Age-related peculiarities of the arteries.

The aorta, its parts. Thoracic aorta: topography, classification of branches. Branches of the thoracic aorta and areas of their blood supply. The internal thoracic artery (branch of the subclavian artery): topography, branches, areas of blood supply. Intrasystem and intersystem arterial anastomoses.

Abdominal aorta: topography, classification of branches. Parietal branches of abdominal aorta: topography, areas of blood supply. Intrinsic branches of abdominal aorta: paired and unpaired. Even and odd intrinsic branches of the abdominal aorta: topography and blood supply areas. Common iliac artery: formation, topography, branches. Internal iliac artery: topography, classification of branches. Parietal and internal branches of the internal iliac artery: topography, blood supply areas, intrasystem and intersystem arterial anastomoses.

Anatomical classification of veins (anterior cruciate, main, extraorganic, intraorganic). Classification of veins according to the structure of the wall. Roots and tributary veins. Superficial veins, deep veins. Venous networks, venous plexuses. Superior vena cava: roots, tributaries, topography. Neparian vein: formation, topography, classification of tributaries, venous blood collection sites. Pivneparna vein: formation, topography, classification of tributaries, venous blood collection sites. Veins of the vertebral column. Inferior vena cava: roots, topography, classification of tributaries. Parietal and intrinsic tributaries of the inferior vena cava, sites of venous blood collection.

The portal hepatic vein: roots, topography, and tributaries. Superior mesenteric vein: topography, tributaries, venous blood collection sites. Inferior mesenteric vein: topography, tributaries, venous blood collection sites. Spleen vein: topography, tributaries, venous blood collection sites.

Venous intrasystemic anastomoses. Venous intrasystemic anastomoses: caffe-caval anastomosis, porto-caval anastomosis, and porto-caffe-caval anastomosis.

Classification of lymphatic vessels. Lymphatic capillaries: wall structure and function. Lymphatic postcapillaries: wall structure and functions. Lymphatic vessels (intraorganic and ectraorganic): wall structure and functions. Superficial and deep lymphatic vessels. Lymphatic trunks: jugular, subclavian, broncho-mediastinal, lumbar, intestinal - their formation, topography, functions. Lymphatic ducts: thoracic duct, right lymphatic duct.



Thoracic duct: roots, topography, tributaries, place of insertion into the venous system. Right lymphatic duct: roots, topography, place of flow into the venous system.

**Topic 14. *Vessels and nerves of the upper extremity. Vessels and nerves of the lower extremity.***

Components of the peripheral nervous system: nerves, nerve nodes, nerve plexuses, nerve endings. General outline of the structure of the nerve. Vascular and nerve bundles. Classification of nerves. Segmentarity of distribution of peripheral nerves. Nerve nodes: classification. General plan of structure of sensory nodes. Spinal nerves: formation, composition of fibers, branches; correspondence to spinal cord segments, system. Cervical plexus: sources of formation, topography, branches, areas of innervation.

Brachial plexus: sources of formation, topography. The trunks of the brachial plexus. Classification of branches.

Axillary artery: sections, branches. Brachial artery, ulnar and radial arteries branches, regions of blood supply. Arterial arches of hand: superficial and deep palm.

Brachial main vein: formation (roots), topography, tributaries. Upper vena cava: formation (roots), topography, tributaries. Veins of the upper extremity: superficial and deep.

Lumbar plexus: sources of formation, topography, branches, areas of innervation. Sacral plexus: sources of formation, topography, classification of branches. Short and long branches of the sacral plexus: coccygeal plexus: sources of formation, topography, branches, innervation sites. External iliac artery, femoral artery, arteries of the shin and foot: branches, regions of blood supply. Veins of the lower extremity: superficial and deep.

**Topic 15. *Test for the course of human anatomy.***

**List of recommended literature**

***Basic literature***

1. Human anatomy: a textbook: in 3 volumes, V 3 / A.S. Golovatsky, V.G.Cerkasov, M.R. Sapin and others - Est. 3rd, finished - Vinnitsa: Nova kniga, 2015. - 376 pp. : il.
2. Cherkasov V.G., Bobryk I.I., Guminsky Yu.Y., Kovalchuk O.I. International Anatomical Terminology (Latin, Ukrainian, Russian and English equivalents) Vinnitsa: Nova kniga, 2010. - 392 p. (Tutorial)

3. Cherkasov V.G., Khmara T.V., Makar B.G., Pronyaev D.V. Human anatomy. Chernivtsi: Medical University. 2012. - 462 pp. (textbook)
4. Human anatomy. V.G. Cherkasov, S.Yu. Kravchuk - Vinnytsya: Nova kniga, 2011. – 640p. (teaching tutorial)
5. Human anatomy / [Koveshnikov V.G., Bobryk I.I., Golovatsky A.S. et al.]; ed.by V.G. Kovezhnikov - Lugansk: Virtual Reality, 2008. - Vol.3.- 400.
6. Sobotta. Atlas of human anatomy. In two volumes. Edited by Ukrainian edition: V.G. Cherkasov., transl. by O. I. Kovalchuk. - Kyiv: Ukrainian Medical Bulletin, 2009.

### ***Additional***

1. Cherkasov V.G., Guminsky Yu.Y., Cherkasov E.V., Shkolnikov V.C. History of Anatomy (developmental history and outstanding anatomists). Lugansk: LTD "Virtual Reality", 2012. - 148 p. (tutorial manual).
2. Mcq for "KROK-1" – human anatomy / Edition 4, revised / Edited by V.G.Cherkasov, I.V.Dzevulskaia IV, O.I.Kovalchuk. Tutorial.
3. Educational manual. Control of independent preparation for practical classes. Module 1 "Anatomy of the locomotor aparate", Module 2 - Splanchnology. Central nervous system. Organs of Sense ", Module 3 -" Heart. Anatomy of the cardiovascular system. " [for the students of higher medical school (pharmaceutical) training. of IV level of accreditation] / Edited by V.G. Cherkasov, I.V. Dzevulskaia, O.I. Kovalchuk.
4. Netter F. Atlas of Human Anatomy / Frank Netter [trans. from english A.A. Zegelsky]. - Lviv: Nautilus, 2004 - 529 p.
5. Frederic Martini Atlas of Human Anatomy: Transl. from the 8th English ed [science adv. V.G.Cherkasov], VSV "Medicine", 2011. - 128 p. (Atlas)

### ***Informational recourses***

<http://anatom.in.ua>

<https://anatom.ua/>

<https://meduniver.com/Medical/Anatom/>

<https://www.primalpictures.com/>

<https://www.visiblebody.com/>

<https://3d4medical.com/>

## Evaluation criteria

Various forms of knowledge control are used (oral, written, combined, testing, practical skills, etc.).

The results of the academic progress of students are put in the form of grades on a national scale, 200-point and ECTS scale and have standardized generalized criteria for assessing knowledge:

### *1. National scale:*

- grade "excellent" (5) is awarded to a student who systematically worked during the semester, showed during the exam versatile and deep knowledge of the program material, is able to successfully perform the tasks provided by the program, has mastered the content of basic and additional literature, has realized the relationship of individual sections of the discipline, their importance for the future profession, found creative abilities in understanding and using the educational and program material, has shown the ability to independently update and replenish knowledge. The level of competence is high (creative);

- a "good" grade (4) is given to a student who found full knowledge of the curriculum material, successfully completes the assignments included in the program, has absorbed the basic literature recommended by the program, has sufficient knowledge of the discipline and is able to independently update and refresh them during further study and professional activities; the competence level is sufficient (constructively-variant);

- assessment "satisfactory" (3) is awarded to a student who found knowledge of the basic curriculum material to the extent necessary for further study and subsequent work in the profession, copes with the tasks provided by the program, made some mistakes in answering the exam and in the performance of examination tasks, but has the necessary knowledge to overcome the mistakes made under the guidance of a scientific and pedagogical employee. The level of competence is average (reproductive);

- the grade of "unsatisfactory" (2) is given to the student who did not reveal sufficient knowledge of the basic curriculum material, made fundamental mistakes in the performance of the tasks provided by the program, cannot use the knowledge without the help of the teacher to further study, could not master the skills of independent work; the competence level is low (receptive - productive).

The final control in the form of credits is evaluated on a two-point scale:

- The mark "passed" is given to a student who has fulfilled the curriculum of the discipline, has no academic arrears; the level of competence is high (creative)

- The grade "failed" is given to a student who didn't follow the study plan of the discipline, has academic debts (grade point average is less than 3.0 and / or absences) level of competence - low (receptive - productive).

**2. Multi-point scale** characterizes the actual performance of each student in mastering the academic discipline. The conversion of the traditional grade for the discipline into a 200-point grade is performed by the University Information and Computing Center with the "Contingent" program according to the formula: grade point average (current / in discipline) x 40. **A national grade of "5" scores 185-200, "4" scores 151-184. "3" - 120-150.**

**3. The ECTS rating scale** evaluates the achievements of students in the discipline, who are studying in the same course in the same major, according to the points they received, by ranking, namely: ECTS Statistical Score "A" top 10% of students, "B" next 25% of students, "C" next 30% of students, "D" next 25% of students, "E" last 10% of students. The ECTS scale establishes whether a student belongs to the group of the best or the worst among the reference group of fellow students (department, specialty) is his/her rating. When converting from a multi-point scale, as a rule, the boundaries of grades "A", "B", "C", "D", "E" do not coincide with the boundaries of grades "5", "4", "3" on the traditional scale. An "A" grade on the ECTS scale cannot equal an "excellent" grade and a "B" grade cannot equal a "good" grade. Students who receive grades of "FX" and "F" ("2") are not entered into the list of students ranked. Such students automatically receive a grade of "E" after retake. A grade of "FX" is assigned to students who have earned the minimum number of points for current academic activities, but who are not given credit for the final control. The grade of "F" is given to students who attended all classroom sessions in the discipline, but did not get an average score (3.00) for the current academic activities and are not allowed to the final control.

### **1. Current progress:**

At the last practical lesson, the teacher is to announce to students the results of their current academic grades, academic debt (if any). Only those students who have no academic debts and have an average grade of at least 3.00 for the current academic activities are allowed to take part in the final attestation.

### **2. Type of final control**

In the discipline "Human Anatomy" final control is in the form of an exam.

### **3. Grades for the course**

To grade a discipline on a 4-point traditional (national) scale, the average score for the discipline is calculated as the arithmetic mean of two components:

1) the current grade point average as the arithmetic average of all current grades (calculated as a number rounded to 2 decimal places)

4,45 - 5,0 «5»

3,75 - 4,44 «4»

3,0 - 3,74 «3»

2) the traditional exam grade.

The results of the exams are evaluated on a 4-point national scale ("excellent", "good", "satisfactory", "unsatisfactory") and a 200-point scale, and are entered on the examination record and the student's record book.

Example:

- Current grade point average is 4.75

- Examination grade - 4

- average grade for the discipline -  $(4.75 + 4) : 2 = 4.38$

- traditional grade for the discipline – 4

The conversion of the traditional grade for the discipline into a 200-point grade is performed by the University Information and Computing Center with the "Contingent". Converting the result of the student's study of the discipline on a 200-point scale and further ranking on a rating scale (ECTS) is necessary to implement the academic mobility of students. This allows the student to continue his or her studies in that discipline at another institution or in another country.

170 to 200 - Excellent (A) (excellent performance with only minor errors)

155 to 169 - Very good (B) (above average with few errors)

140 to 154 - Good (C) (generally satisfactory, with some significant errors)

125 to 139 - Satisfactory (D) (not bad, but with some significant deficiencies)

111 (min) to 124 - Sufficient (E) (performance satisfies the minimum criteria)

60 to 110 - Satisfactory (D) (not bad, but with some significant deficiencies)

1 to 59 - Unsatisfactory (F) (with obligatory repeat course of the discipline)

### ***Assessment of the student's independent work***

Material for independent work of students, which is provided in the topic of practical training simultaneously with the classroom work, is assessed during the current control topics at the appropriate classroom training.

Evaluation of topics that are carried out for independent work and are not included in the topics of classroom training are controlled during the final control of the topic.

Evaluation of the Student's Individual Work

A maximum of 4 points is awarded for the student's individual work. Grades for individual work are added to the sum of the grades for the student's current course work.

Points for individual work may be awarded to students who have written and reported on essays from the recommended topics with the use of additional literature and have won prizes for participation in the Olympiad in the discipline among students of their university and higher educational institutions of Ukraine.

***Recommendations of the Department of Human Anatomy on the system of making up missed training classes.***

A student who has missed practical training classes must process them independently (without grades).

To work on the missed class the student should have:

- a dictionary of Latin terms on the topic of the class;
- a lecture conspectus;
- diagrams, drawings, provided in the process of independent work of the student
- A short synopsis, which reflects the basic factual material of the topic.

The instructor marks the presence of this list in the journal.

***Recommendations on the methodology of students' independent preparation for practical exercises:***

1. Read the topic of the class from the textbook;
2. During the second, more in-depth reading, prepare a brief outline of the topic;
3. Write out in the dictionary and study the Latin terms on the topic of the lesson;
4. Review in the atlas the anatomical structures described in the material of the topic of the class.
5. Prepare answers to questions on the topic of the missed class, which are specified in the methodological developments of the department.
6. Prepare diagrams and pictures of the structure of different anatomical structures, which are provided by the methodical developments of the department "Educational-methodical manual. Control of independent preparation for practical classes". [For students of higher medical (pharmaceutical) educational institutions. IV accreditation level]. stamp of Ministry of Health of Ukraine, Ministry of Education and Science of Ukraine, protocol № 1 / 11-1165 from 23.02.2010.
7. The anatomical structures in the sectional hall should be examined and studied using anatomical specimens in accordance with the questions listed in the guidelines (list of practical skills);

The most difficult and incomprehensible for the student questions you can ask the teacher at the beginning of the missed lesson.

***During the workout, the student:***

- answers the teacher's basic and finite level questions;
- answers the teacher's questions about the definition of anatomical structures on X-ray, CT, MRI, angiograms (visualization of anatomical formations by modern clinical research methods)
- demonstrates knowledge of practical skills on cadaveric material, individual anatomical preparations, skull, skeleton, plaster casts, tables;

- gives answers to 10 standardized test questions (CRQ-1).

Attendance at all types of classroom sessions (lectures, practical classes) is mandatory.

Late attendance at all types of classroom lessons (lectures, practical classes) is not allowed.