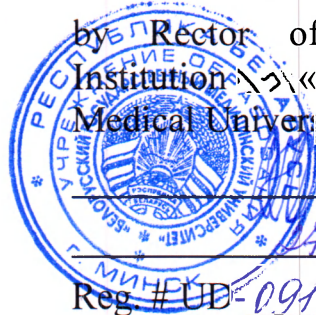


**MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS**  
Educational Institution  
**BELARUSIAN STATE MEDICAL UNIVERSITY**

**APPROVED**

by Rector of the Educational  
Institution «Belarusian State  
Medical University»

S.P.Rubnikovich



24.06.2023

Reg. # UD-091-010/2324/edu.

**Контрольный  
экземпляр**

**HUMAN ANATOMY**

**Curriculum of the educational institution  
in the academic discipline for the specialty**

**7-07-0911-01 «General Medicine»**

Curriculum is based on the educational program «Human Anatomy», approved 27.06.2023, registration # УД-091-010/2324/уч.; on the educational plan in the specialty 7-07-0911-01 «General Medicine», approved 17.05.2023, registration # 7-07-0911-01/2324/mf.

**COMPILERS:**

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**RECOMMENDED FOR APPROVAL:**

by the Department of Normal Anatomy of the educational institution «Belarusian State Medical University»  
(protocol # 12 of 22.05.2023);

by the Scientific and Methodological Council of the educational institution «Belarusian State Medical University»  
(protocol # 6 of 27.06.2023)

## EXPLANATORY NOTE

«Human Anatomy» is the academic discipline of the Morphological Module containing systematized scientific knowledge and techniques in the field of morphology, studying the development and structure of the human body, its organs and systems, and methods of their investigation.

The aim of the discipline «Human Anatomy» is the formation of basic professional competence, which is based on knowledge of the principles of development and structure of the human body, necessary for use in the study of subsequent educational theoretical and clinical disciplines and application in the professional activities of a doctor.

The objectives of the discipline «Human Anatomy» are to form students' scientific knowledge about:

the structure of the human body, its parts, organs and organ systems based on the achievements of modern science, taking into account their functions, individual, gender, constitutional and age characteristics, as well as social factors;

development of organs and systems (organogenesis) of the human body, some anomalies and malformations of their development;

interdependence and unity of the structure and function of human organs;

ethics and deontology in medicine.

The knowledge, skills and abilities, acquired during the study of the academic discipline «Human Anatomy» are necessary for successful mastering of the following academic disciplines: «Pathologic Anatomy», «Normal Physiology», «Psychiatry and Narcology»; modules: «Therapy Module #1», «Therapy Module # 2», «Therapy Module # 3», «Surgical Module # 1», «Surgical Module # 2», «Surgical Module # 3», «Internal Disease Module», «Obstetrics and Gynecology Module», «Pediatric Module».

Studying the educational discipline «Human Anatomy» should ensure the formation of students' basic professional competence: while providing medical care use knowledge about the patterns of the human body development and anatomical structure, its systems and organs, taking into account age, gender and individual characteristics.

**As a result of studying the discipline «Human Anatomy» the student should**

**know:**

the structure of individual organs, their position in the human body and the space relationship with other organs, the relationship between the structure of organs and function;

individual, sex and age characteristics of the organs, organ systems and the human body as a whole;

structural features of organs, and organ systems of the human body depending on biological and social factors;

variations in the normal structure and abnormalities in the structure of organs and organ systems due to their embryonic development;



sources of blood supply, venous and lymphatic outflow from regions and organs of the human body, sources of their innervation;

radiological anatomy of organs;

**be able to:**

show organs, their parts and other anatomical structures on cadavers, anatomical specimens, tables, posters, models and other teaching aids;

determine the position of individual organs, bony prominences on the human body; project organs, the major blood vessels and nerves on the body surface; find points of palpation (pulse) of blood vessels;

define organs, their parts and other anatomical structures in radiographs;

recognize main organ structures;

apply acquired knowledge in solving problem-based tasks;

justify a decision when solving a problem-based task;

objectively assess knowledge acquired theoretical background and the level of mastering practical skills;

**master:**

the skill of positioning of the bones of the axial and appendicular skeleton according to their location in the body;

the skill of demonstrating movements in the joints of the human body in the «norm» around the conventional axes of rotation;

the skill of demonstrating the «normal» position of the internal organs and their parts with respect to his own body and the «patient's body» for the proper assessment of the holotopy and syntopy of the organ;

the skill of usage of anatomical terminology and eponyms necessary for the discipline «Human Anatomy».

**Total number** of hours for the study of the discipline is 414 academic hours. Classroom hours according to the types of studies: lectures – 26 hours (including 9 hours of supervised self-study), laboratory studies - 196 hours, student independent work (self-study) – 192 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (1st and 2nd semesters) and examination (3rd semester).

Form of higher education – full-time.



**ALLOCATION OF ACADEMIC TIME  
ACCORDING TO SEMESTERS OF STUDY**

Code, name of the specialty	semester	Number of academic hours						Form of intermediate assessment
		total	in-class	including			out-of-class self-studies	
				lectures (including supervised independent work)	supervised student supervised independent work	laboratory studies		
<b>7-07-0911-01 «General Medicine»</b>	1	108	63	6	2	57	45	credit
	2	198	95	10	3,5	85	103	credit
	3	108	64	10	3,5	54	44	exam

## THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures	laboratory
<b>1. Introduction into the discipline «Human Anatomy»</b>	<b>1</b>	<b>1</b>
<b>2. Bones</b>	<b>1</b>	<b>17</b>
2.1. Anatomy of the skeleton	1	1
2.2. Axial skeleton		10
2.3. Appendicular skeleton		6
<b>3. Joints</b>	<b>2</b>	<b>15</b>
3.1. Development of bony joints. Classification of joints	2	2
3.2. Joints of the axial skeleton		3
3.3. Joints of the appendicular skeleton		10
<b>4. Muscular system</b>	<b>2</b>	<b>24</b>
4.1. Muscle tissue. Muscle as an organ	2	2
4.2. Functional anatomy of the muscles		22
<b>5. Visceral systems</b>	<b>4</b>	<b>40</b>
5.1. Digestive system	2	18
5.2. Respiratory system		6
5.3. Thoracic cavity		2
5.4. Urinary system	2	4
5.5. Genital (reproductive) systems		6
5.6. Perineum		2
5.7. Abdominopelvic cavity	-	2
<b>6. Endocrine glands</b>	<b>-</b>	<b>2</b>
<b>7. Cardiovascular system</b>	<b>6</b>	<b>42</b>
7.1. Cardiovascular system: heart, arteries, blood vessels of the microcirculatory bed, veins	2	2
7.2. Heart. Pericardium		6
7.3. Arteries		20
7.4. Veins		8

Section (topic) name	Number of class hours	
	lectures	laboratory
7.5. Lymphatic vessels, trunks and ducts	2	6
<b>8. Lymphoid system</b>	-	<b>1</b>
<b>9. Nervous system</b>	<b>8</b>	<b>44</b>
9.1. Nervous system and its functions	1	2
9.2. Central nervous system	3	18
9.3. Peripheral nervous system	2	18
9.4. Autonomic nervous system	2	6
<b>10. Sense organs</b>	<b>2</b>	<b>9</b>
10.1. Anatomic and functional characteristics of the sense organs	1	1
10.2. Eye and accessory visual structures	1	3
10.3. Ear		3
10.4. Olfactory organ. Gustatory organ.		1
<b>11. Integument</b>		<b>1</b>
<b>Total hours</b>	<b>26</b>	<b>196</b>



## CONTENT OF THE EDUCATIONAL MATERIAL

### 1. INTRODUCTION INTO THE DISCIPLINE «HUMAN ANATOMY»

Significance of studying anatomy. Systematic anatomy, regional anatomy, comparative anatomy, age anatomy, surface anatomy, anthropology. Methods of study and research in Anatomy. Macroscopic (Gross), macro-microscopic, microscopic anatomy. Methods of studying anatomy on cadaveric material: dissection, vascular perfusion by vascular fillings, plastination, bleaching, corrosion, radiography, transversal cuts after N.I.Pirogov, macro-and microscopy. Methods of studying anatomy of the living body: anthropometry, radiography, computed tomography, ultrasound, endoscopy.

Germinal layers and their derivatives. Embryogenesis of organs and systems.

Organs and systems of organs.

The concept of the norm and variants of the norm. Constitutional body types. Age, gender and individual features of the human body structure. Anatomical terms. Anatomical terminology. Axes and planes used in anatomy.

Anatomy in Belarus. Teaching Anatomy and beginning of anatomical research in the XVIII-XIX centuries at the first medical schools in Grodno and Vilno. Modern history of anatomy: establishment of the Belarusian school of anatomists (S.I.Lebedkin, D.M.Golub, P.I.Lobko); scientific spheres developed by the Belarusian anatomists, the development of the Belarusian anatomical terminology (P.G.Pivtchenko, S.P.Yaroshevich).

### 2. BONES

#### 2.1. Anatomy of the skeleton

Axial skeleton, additional skeleton. Development of bones in human ontogenesis. Concept of «bony age». Classification of bones. The structure of the bone. Periosteum. Bone as an organ. Image of bones on radiographs. The influence of social, biological, physical and chemical factors on the development and structure of the skeleton.

#### 2.2. Axial skeleton

**Vertebral column.** General data concerning the development of the vertebral column. Variations and anomalies of development. Structure of the vertebrae. Characteristics of the cervical, thoracic, lumbar, sacral and coccygeal vertebrae.

**Thoracic skeleton.** Ribs and sternum. Development of the chest bones. Variations and anomalies. Structure of the ribs. True, false and fluctuating ribs. Structure of the sternum.

**Skull (cranium).** Development of the skull. Variations and anomalies. Neurocranium, viscerocranium. Structure of the cranial bones: frontal, sphenoid, occipital, parietal, ethmoid, temporal. Structure of the facial bones: maxilla and mandible, the inferior nasal concha, vomer, nasal, lacrimal, zygomatic, palatine, and sublingual bones.

Topography of the skull: calvaria, interior and exterior (surfaces) of the base of skull. Anterior, middle and posterior cranial fossae; orbit, nasal cavity, bony framework of the oral cavity; temporal, infratemporal and pterygopalatine fossae.

Skull of a newborn. Sex and individual features of the skull structure. Roentgen anatomy of the skull.

### **2.3. Appendicular skeleton**

**Bones of the upper and lower extremities (limbs).** Development of the limb bones. Variations and congenital anomalies.

**Bones of the upper extremity (limb).** Bones of the shoulder (pectoral) girdle. Clavicle, scapula. Bones of the upper limb free part: humerus, bones of the forearm and hand. Sesamoid bones. Roentgen anatomy of the upper limb bones.

**Bones of the lower extremity (limb).** Bones of the pelvic girdle. Hip bone. Bones of lower limb free part: femur, bones of the leg and foot. Sesamoid bones. Roentgen anatomy of the lower limb bones. Similarities and differences in the structure of the skeleton of the upper and lower limbs in relation to their functions.

## **3. JOINTS**

### **3.1. Development of joints. Classification of joints**

Fibrous joints: syndesmosis, sutures, gomphosis; cartilaginous joints: synchondrosis, symphysis; synovial joints. Structure of the synovial joint. Classification of synovial joints. Age related changes of joints in humans.

### **3.2. Joints of the axial skeleton**

**Joints of Vertebral column:** fibrous and cartilaginous joints of vertebral column, synovial joints of vertebral column (zygapophysial, atlanto-axial sacrococcygeal joints). Vertebral column as a whole: structure, curvatures, movements.

**Joints of the thorax.** fibrous and cartilaginous joints of thorax, synovial joints of thorax (sternocostal and costovertebral joints). Thorax as a whole: its individual and age features, typological characteristics in relation to the body types.

**Joints of the skull:** cranial fibrous and cartilaginous joints, cranial synovial joints (temporomandibular, atlanto-occipital).

### **3.3. Joints of the appendicular skeleton**

**Joints of the upper extremity (limb).** Joints of the pectoral girdle: acromioclavicular and sternoclavicular joints.

Joints of the free upper extremity. Shoulder (glenohumeral) joint. Elbow joint. Joints between the bones of the forearm. Radiocarpal (wrist) joint. Joints of the hand: intercarpal, midcarpal, carpometacarpal, carpometacarpal joint of thumb, intermetacarpal, metacarpophalangeal, interphalangeal.

**Joints of the lower extremity (limb).** Joints of the pelvic girdle: pubic symphysis, sacroiliac joint. Pelvis as a whole. Large and small pelvis. Dimensions of the female pelvis. Sexual characteristics of the pelvis.

Joints of the free lower limb. Hip joint. Age characteristics of the hip joint. Structural preconditions of the congenital dislocation in the hip joint. Knee joint. Joints of the leg. Ankle joint. Joints of the foot: intertarsal joints, tarsometatarsal, intermetatarsal, metatarsophalangeal, interphalangeal joints. Arches of the foot and supporting ligaments.



## 4. MUSCULAR SYSTEM

### 4.1. Muscle tissue. Muscle as an organ

Smooth (nonstriated), striated and cardiac muscles: their structural and functional characteristics. Development of muscles in human ontogenesis. Variations and anomalies.

Muscle as an organ. Structure of the skeletal muscle. Auxiliary apparatus of muscles. Classification of muscles by shape, structure, origin and functions. Age related muscle changes.

### 4.2. Functional anatomy of the muscles

**Muscles and fasciae of the head.** Classification of muscles of the head. Facial and masticatory muscles. Fasciae of the head. Functions of facial and masticatory muscles.

#### **Muscles and fasciae of the neck**

Classification of muscles of the neck. Superficial muscles of the neck. Suprahyoid and infrahyoid muscles. Deep muscles of the neck. Suboccipital muscles. Topography of the neck. Fasciae of the neck. Actions of the neck muscles.

**Muscles and fasciae of the back.** Superficial and deep muscles of the back. Fasciae of the back. Action of the back muscles.

**Muscles and fasciae of the chest. Diaphragm.** Muscles of the chest that have attachment on the bones of the upper limb, proper muscles of the chest. Actions of the chest muscles. Diaphragm: structure, topography and functions. Fasciae of the chest and diaphragm. «Weak places» of the diaphragm as anatomical prerequisites of the diaphragmatic hernias.

**Muscles and fasciae of the abdomen.** Anterior, lateral and posterior muscles of the abdomen. Functions of the abdominal muscles. Abdominal press. Regions of the abdominal wall. Rectus sheath. Linea alba, umbilical ring. Inguinal canal. Abdominal fasciae.

**Muscles and fasciae of the upper limb.** Muscles and fasciae of the shoulder girdle. Muscles of the free part of the upper limb: muscles of the arm, forearm and hand: their structure, topography, actions, fasciae, synovial bursae and tendon sheaths. Topography of the upper limb: axillary fossa, axillary cavity, cubital fossa, grooves and canals of the arm, forearm and hand.

**Muscles and fasciae of the lower limb.** Muscles of the pelvic girdle: structure, topography and actions. Muscles of the lower limb free part: muscles of the thigh, leg and feet: topography and actions. Topography of the lower limb: foramens, canals, fossae, grooves. Fasciae, synovial bursae and tendon sheaths of the lower limb.

## 5. VISCERAL SYSTEMS

### 5.1. Digestive system

**Development and general structure of the digestive (alimentary) system.** Primitive gut: pharyngeal gut and trunk gut. Trunk gut divisions; foregut, midgut and hindgut and their derivatives. (adventitia and serous membrane). Congenital anomalies of gut development. General structural characteristics of the digestive tube wall: mucosa, submucosa, muscular layer, outer membrane (adventitia and serous membrane). Structural and functional characteristics of organs of the digestive



system. Digestive glands, their development, structure and function. Projection lines on the surface of the human body, regions, and parts of the body. Skeletopy, holotopy and syntopy of internal organs. Age related changes in the structure of organs of the digestive system.

**Mouth and oral cavity.** Vestibule and oral cavity proper, their walls. Palate: hard palate, soft palate. Palatine tonsils. Cheeks. Lips. Diaphragm of the mouth. Organs of the oral cavity.

**Teeth.** Structure of the teeth. Permanent teeth. Milk (decidua) teeth. Dental formula. Terms of eruption of decidua and permanent teeth. Tooth anomalies.

**Tongue.** Structure and function of the tongue. Muscles of tongue. Lingual tonsil.

**Glands of the mouth.** Large salivary glands: parotid, submandibular, sublingual; small salivary glands. Structure of the salivary glands.

**Pharynx.** Structure, topography and function of the pharynx. Muscles of pharynx. Fauces. The act of swallowing. Pharyngeal and tubal tonsils. Pharyngeal lymphoid ring.

**Esophagus.** Structure, topography and function of the esophagus. Roentgen anatomy of the esophagus.

**Stomach.** Structure, topography and function of the stomach. Roentgen anatomy of the stomach. Shape of the stomach in humans of different body types.

**Small intestine.** Duodenum: structure, topography and function. Mesenteric portion of the small intestine (jejunum and ileum): structure, topography and function. Roentgen anatomy of the small intestine.

**Large intestine.** Parts of the large intestine (cecum with the vermiform appendix, colon, rectum): structure, topography and function. Roentgen anatomy of the large intestine. Similarities and differences in the structure of small and large intestine.

**Liver.** Structure, topography and function of the liver. Structural and structural-functional units of the liver. Hepatic ducts. Common bile duct.

**Gallbladder.** Structure, topography, function of the gallbladder. Roentgen anatomy of the liver, gallbladder and bile ducts.

**Pancreas.** Structure, topography, and function. Pancreatic ducts.

## **5.2. Respiratory system**

**Development of the respiratory organs.** Congenital anomalies.

Upper and lower respiratory tract, organs of the respiratory system. General principles of the respiratory tract structure. The relationship between the structure of respiratory organs and their functions.

**Nose. Nasal cavity. Paranasal sinuses.** Structure, topography and function.

**Larynx.** Structure: laryngeal cartilages, joints and muscles, laryngeal cavity; topography and function of the larynx. Laryngoscopy view and roentgen anatomy of the larynx.

**Trachea and bronchi.** Structure, topography and function of the trachea and bronchi.

**Lungs.** Structure, topography, and lung function. Structural and structural-functional units of the lungs. Projection of the lungs borders onto the surface of the body.

### 5.3. Thoracic cavity

**Pleura.** Structure, topography and function of the pleura. Parietal and visceral pleura. Pleural cavity. Pleural sinuses, and their significance. Projection of the pleural «borders» (reflections of the parietal pleura) on the surface of the body. Roentgen anatomy of the trachea, bronchi, lungs and pleura.

**Mediastinum:** divisions, organs of mediastinum. Connections of the mediastinum with the interfascial spaces of the neck.

### 5.4. Urinary system

**Development of the urinary organs.** Congenital anomalies. Age related changes in the structure of the urinary organs in human.

**Kidney.** Structure, topography and function of the kidney. Structural and structural-functional units of the kidney. Tunics of the Shell kidneys. Fixating structures of the kidney. Minor calyces, major calyces, renal pelvis: structure, topography, and function.

**Ureter.** Structure, topography, and function of the ureter.

**Urinary bladder.** Structure, topography, and function of the urinary bladder.

**Urethra.** Structure, topography, and function of male and female urethras. Roentgen anatomy of the urinary organs.

### 5.5. Genital (reproductive) systems

**Male genital system.** Development of the male genital organs. Congenital anomalies. Age related changes of male genital organs.

**Internal and external male genitalia:** male internal genital organs: testis, epididymis, testicular appendage, spermatic cord, ductus deferens, ejaculatory ducts, seminal gland, prostate, bulbo-urethral gland. Structure, topography and function of the male internal genital organs.

Male external genitalia: penis, scrotum. Structure, topography and function of the male external genital organs.

**Female genital system.** Development of the female genital organs. Anomalies. Age related changes of the female genital organs.

**Internal and external female genitalia:** female internal genital organs: ovary, uterine tube, uterus, vagina, ovary appendages. Structure, topography and function of internal female genitalia.

Female external genitalia: vulva (mons pubis, labia majora and minora, vestibule of vagina, clitoris, bulb of vestibule, greater and lesser vestibular glands). Structure, topography and function of the external female genitalia.

### 5.6. Perineum

Perineum. Regions (triangles): urogenital and anal triangles, structure, sex related features. Muscles and fasciae of the perineum. Perineal spaces, ischioanal fossa. Pelvic floor: muscles and fasciae of the pelvic diaphragm.

### 5.7. Abdominopelvic cavity

Abdominal cavity. Pelvic cavity. Extraperitoneal space. Peritoneum. Structure, topography and function of peritoneum. Parietal and visceral peritoneum. Peritoneal



cavity. Peritoneal ligaments, mesentery, mesocolon, folds, greater and lesser omentum, omental bursa, recesses, spaces, fossae, paracolic gutters, sinuses and pouches. Extra- and intraperitoneal organs.

## 6. ENDOCRINE GLANDS

Development, classification, age related features of endocrine glands.

**Thyroid gland:** structure, topography, and function

**Parathyroid glands:** structure, topography, and function.

**Pituitary gland:** structure, topography, and function.

**Pineal gland:** structure, topography, and function.

**Suprarenal gland:** structure, topography, and function.

**Paraganglia:** structure, topography, and function.

**Endocrine parts of the pancreas, ovaries and testes.**

## 7. CARDIOVASCULAR SYSTEM

### 7.1. Cardiovascular system: heart, arteries, vessels of microvasculatory bed, veins

Development of the cardiovascular system. Fetal circulation. Congenital anomalies. Structure-functional features of different parts of the cardiovascular system. The relationship of vascularization and structure-functional characteristics of an organ. Anastomoses of blood vessels: arterial, venous, arteriovenous. Intersystemic (heterocladic) and intrasystemic (homocladic) anastomoses. Pathways for the collateral blood flow.

Pulmonary (lesser) circulation. Systemic (greater) circulation. Types of blood vessels.

### 7.2. Heart. Pericardium

Structure, topography and function of the heart. Valves of the heart. Conducting system of the heart. Arteries and veins of the heart. Projection of the heart and its valves on the anterior thoracic wall.

Structure, topography, and function of the pericardium. Pericardial cavity and sinuses of the pericardium. Roentgen anatomy of the heart and large vessels.

### 7.3. Arteries

**Arteries of the pulmonary circulation:** pulmonary trunk, pulmonary arteries and their branches. Topography of arteries of the pulmonary circulation.

**Arteries of the systemic circulation. Aorta:** ascending aorta, aortic arch, descending aorta. Topography of the aorta.

**Ascending aorta.** Branches of the ascending aorta: coronary arteries, areas of their blood supply, their anastomoses.

**Aortic arch.** Branches of the aortic arch: brachiocephalic trunk, left common carotid artery, left subclavian artery.

**Arteries of the head and neck.** Common carotid artery: topography. External carotid artery: topography and branches. Internal carotid artery: topography and branches. Blood vessels of the brain and spinal cord. Subclavian artery: topography, parts and branches. Anastomoses between arteries of the head and neck.



**Arteries of the upper extremity:** axillary artery: topography, parts, branches. Brachial, radial and ulnar arteries: topography, branches, projections on the skin. Superficial and deep palmar arterial arches: the arteries forming the arches, topography and projection on the surface of the palm. Anastomoses of the arteries of the upper extremity.

**Descending aorta. Thoracic aorta:** topography, parietal and visceral branches. Anastomoses.

**Abdominal aorta:** topography, parietal and visceral branches. Anastomoses between the branches of the abdominal aorta.

**Arteries of the pelvis.** Common iliac artery and its topography. External iliac artery: its topography and branches. Internal iliac artery: its topography, the parietal and visceral branches. Anastomoses of the pelvis arteries.

**Arteries of the lower limb.** Femoral artery: its topography and branches. Popliteal artery: its topography and branches. Anterior tibial artery, dorsal artery of the foot: their topography and branches. Posterior tibial artery: its topography and branches. Arterial arches of the foot and arteries forming them. Projection of the great arteries of the lower limb on the skin. Anastomoses between the branches of the lower extremity arteries. Pressure points (bony and muscular landmarks) to check arterial pulses and cease bleeding.

#### 7.4. Veins

**Veins of the pulmonary circulation.** Pulmonary veins. Topography.

#### **Veins of the systemic circulation**

**Superior vena cava:** tributaries, topography. Azygos and hemiazygos veins: tributaries and topography. Brachiocephalic veins: tributaries, topography. Internal, external, anterior jugular veins. Dural venous sinuses, veins of brain, orbital veins, diploic and emissary veins. Connection between the cranial and extracranial veins. Anastomoses of the head and neck veins. Subclavian vein: tributaries, topography. Axillary vein: tributaries, topography. Superficial and deep veins of the upper limb. Anastomoses of the upper limb veins.

**Inferior vena cava:** tributaries and topography. Common iliac vein: tributaries and topography. Internal iliac vein: tributaries and topography. External iliac vein: tributaries and topography. Anastomoses of the tributaries of the iliac veins. Superficial and deep veins of the lower limb. Anastomoses of the veins of the lower limb.

**Hepatic portal vein:** formation and tributaries, topography. Splenic, inferior mesenteric and superior mesenteric veins: tributaries, topography. Anastomoses between the tributaries of the superior and inferior venae cava and the hepatic portal vein: portocaval and cavo-caval anastomoses.

#### 7.5. Lymphatic vessels, trunks and ducts

**Lymphatic vessels:** structure, formation, classification. Lymphatic vessels: of the head, neck, upper limb, thorax, abdomen, pelvis and lower limb.

**Lymphatic trunks:** formation, topography, function.

**Lymphatic ducts:** thoracic duct, right lymphatic duct. Thoracic duct: formation, structure, and topography. Right lymphatic duct: formation, structure, and topography.

## 8. LYMPHOID SYSTEM

**Primary lymphoid organs.** Red bone marrow: structure, location, and function. Thymus: structure, topography, and function.

**Secondary lymphoid organs.** Spleen: structure, topography, and function. Pharyngeal lymphoid ring. Lymphoid structures of the digestive, respiratory, urinary system (solitary lymphoid nodules and aggregates of lymphoid nodules, vermiform appendix). Lymph nodes: structure, topography, and function. Regional lymph nodes of the: head and neck, upper limb, thorax, abdomen, pelvis, lower limb. Age related changes of lymphoid organs.

## 9. NERVOUS SYSTEM

### 9.1. Nervous system and its functions

Development of the nervous system in ontogenesis. Congenital anomalies.

General plan of the nervous system organization: central part (central nervous system) and peripheral part (peripheral nervous system); somatic and autonomic divisions of the nervous system.

Neuron as a structural and functional unit of the nervous system. Gray and white matter of the central nervous system, structural elements of the peripheral nervous system. Reflex arc.

### 9.2. Central nervous system

**Spinal cord.** Topography, external and internal structure, functions. Segments of the spinal cord. Age related changes of the spinal cord. Meninges of the spinal cord.

**Brain.** Parts of the brain: myelencephalon, metencephalon, mesencephalon, diencephalon, telencephalon.

Brainstem: medulla oblongata, pons, midbrain.

**Medulla oblongata (myelencephalon).** Topography, external and internal structure, functions of the medulla oblongata.

**Pons and cerebellum (hindbrain, metencephalon).** Topography, external and internal structure, functions of the pons and cerebellum. Fourth ventricle. Rhomboid fossa. Projection of the cranial nerves nuclei on the surface of the rhomboid fossa.

**Midbrain (mesencephalon):** topography, external and internal structure, functions. Aqueduct of the midbrain.

**Diencephalon:** thalamus, metathalamus, epithalamus, subthalamus, hypothalamus, preectum, preoptic area. Topography, external and internal structure, functions of the diencephalon. Third ventricle.

**Reticular formation:** topography, structure, function.

**Telencephalon.** Cerebral hemispheres: lobes, sulci and gyri. Olfactory structures of the basal forebrain (Rhiencephalon, Olfactory brain). Localization of function in the cerebral cortex. Concept of the analyzers. Basal nuclei (corpus striatum). White matter of the telencephalon. Lateral ventricles.

**Limbic system.** Structures, topography, functions.

**Topography of the cranial nerves in the base of the brain.**

**Meninges.** Dura and leptomeninges. Formation of cerebrospinal fluid and pathways of its outflow.



**Conduction pathways (tracts) of the brain and spinal cord.**

### **9.3. Peripheral nervous system**

**Structural organization of the peripheral nervous system.** Principles of the structure of the cranial and spinal nerves.

#### **Cranial nerves.**

General characteristics and classification of the cranial nerves. Characteristics of the individual cranial nerves.

**Terminal nerve (0):** formation, fibers composition, topography, and function.

**Olfactory nerves (I), optic nerve (II):** formation, fibers composition, topography, and function.

**Oculomotor nerve (III), trochlear nerve (IV), abducens nerve (VI):** nuclei, fibers composition, topography, branches, areas of innervation.

**Trigeminal nerve (V):** nuclei, trigeminal ganglion, fibers composition, topography of the nerve and its branches, connection with the vegetative ganglia and cranial nerves, areas of innervation.

**Facial nerve (VII):** facial nerve proper, intermediate nerve, nuclei, ganglia, fibers composition, topography of the nerve and its branches, connection with the vegetative ganglia and cranial nerves, areas of innervation.

**Vestibulocochlear nerve: vestibular nerve, cochlear nerve (VIII):** nuclei, ganglia, fibers composition, topography of the nerve and its branches, and functions.

**Glossopharyngeal nerve (IX), vagus nerve (X):** nuclei, ganglia, fibers composition, topography of the nerve and its branches, connections with the vegetative ganglia and cranial nerves, areas of innervation.

**Accessory nerve (XI) and hypoglossal nerve (XII):** nuclei, fibers composition, topography of the nerve and its branches, connections with cranial and spinal nerves, areas of innervation.

**Spinal nerves.** General characteristics: formation, fibers composition, topography, branches, areas of innervation. Dorsal (posterior) branches of the spinal nerves and their areas of innervation. Meningeal and communicating branches of the spinal nerves. Ventral (anterior) branches of the spinal nerves, formation of plexuses.

**Cervical plexus:** formation, topography, nerves, branches, areas of innervation.

**Brachial plexus:** formation, topography, roots, trunks, supraclavicular branches, areas of innervation; infraclavicular part: cords, nerves, branches, areas of innervation.

**Intercostal nerves:** topography, branches, areas of innervation.

**Lumbar plexus:** formation, topography, nerves, branches, areas of innervation.

**Sacral plexus:** formation, topography, nerves, branches, areas of innervation.

**Coccygeal plexus:** formation, topography, nerves, branches, areas of innervation.

### **9.4. Autonomic nervous system**

**Structure and function of the autonomic nervous system.** Sympathetic and parasympathetic divisions of the autonomic nervous system. High, segmental and



local centers of the autonomic nervous system. Autonomic division of peripheral nervous system. Reflex arc of the autonomic nervous system.

**Sympathetic division (thoracolumbar part):** centers in the spinal cord. Sympathetic trunk (paravertebral ganglia), ganglia and interganglionic branches of the sympathetic trunk, communicating branches of the spinal nerves. Sympathetic nerves and branches of the cervical, thoracic, lumbar and sacral parts of the sympathetic trunk. Prevertebral ganglia. Perivascular plexuses.

**Parasympathetic division (craniosacral part):** centers in the brain and spinal cord. Cranial and vagal parts: parasympathetic ganglia and fibers of the cranial nerves; sacral part: pelvic splanchnic nerves, pelvic ganglia and branches.

Thoracic, abdominal, and pelvic plexuses. Enteric plexus (enteric part of autonomic division). Innervation of organs of the head and neck, thoracic, abdominal and pelvic cavities. Innervation of blood vessels.

## 10. SENSE ORGANS

### 10.1. Anatomic and functional characteristics of the sense organs

Development of the sense organs. Congenital anomalies. Age related changes in the sense organs.

### 10.2. Eye and accessory visual structures

Eyeball: layers of eyeball (fibrous, vascular, inner), optic nerve, lens, chambers of the eyeball, aqueous humor, vitreous body. Accessory visual structures: extra-ocular muscles, fascial sheath of eyeball, orbital fat body, orbitalis muscle, eyelids, conjunctiva, lacrimal apparatus. Visual conduction pathway.

### 10.3. Ear

External ear: auricle, external acoustic meatus, tympanic membrane. Middle ear: tympanic cavity, auditory ossicles (joints and muscles of the auditory ossicles) auditory tube. Structure, topography, and functions. Internal ear (vestibular-cochlear organ): bony labyrinth and membranous labyrinth: structure, topography, and function. Auditory and vestibular conduction pathways.

### 10.4. Olfactory organ. Gustatory organ

**Olfactory organ:** olfactory part of nasal mucosa. Pathway of olfactory conduction.

**Gustatory organ:** taste buds of the tongue, their topography. Pathway of taste conduction.

## 11. INTEGUMENT

Integument: skin and skin appendages. Subcutaneous tissue. Brest. Functions of the skin. Pathways conducting exteroceptive senses.

## ACADEMIC DISCIPLINE CURRICULAR CHART

Section, topic #	Section (topic) name	number of hours			Self-studies	Form of control
		lectures	supervised student work	laboratory		
	<b>1st semester</b>	<b>6</b>	<b>2</b>	<b>57</b>	<b>45</b>	
1.	Introduction into the discipline «Human Anatomy»	1	0,5	1	1	
2.	Bones	1		17	12	
2.1.	Anatomy of the skeleton	1	-	1	1	
2.2.	Axial skeleton			10	7	
	Introduction to anatomy. General anatomy of the skeletal system	2	0,5	-	1	Electronic tests, paper test, interview, essays
	Study of anatomy. Anatomical terminology. Terms of position and direction, axes and planes. Axial and appendicular skeleton. Vertebral column. Thoracic, cervical and lumbar vertebrae. Sacrum and coccyx. Skeleton of the thorax. Ribs and sternum	-	-	3	2	Interviews, tests, control questioning, essays, electronic tests
	Cranium (skull): neurocranium and viscerocranium (facial skeleton). Bones of the neurocranium: frontal, parietal, occipital, sphenoid, ethmoid	-	-	3	2	Interviews, tests, control questioning
	Temporal bone. Bones of the facial skeleton: maxilla, mandible, palatine bone, inferior nasal concha, vomer, nasal, lacrimal, zygomatic, and hyoid bones	-	-	3	2	Interviews, tests, control questioning
	Cranium as a whole. Paranasal sinuses. Cranium of a newborn. Age and gender characteristics of the cranium. Development of the cranium and its anomalies. Roentgen anatomy of the cranium	-	-	3	2	Interviews, tests, control questioning



2.3.	<b>Appendicular skeleton</b>			6	4	
	Bones of upper limb: pectoral (shoulder) girdle and free part of the upper limb. Roentgen anatomy of the upper limb bones. Anatomical predispositions to fractures of the upper limb bones	-	-	3	2	Interviews, tests, control questioning
	Bones of lower limb. Pelvic girdle and free part of the lower limb. Roentgen anatomy of the lower limb bones. Anatomical predispositions to fractures of the lower limb bones	-	-	3	2	Interviews, tests, control questioning, electronic tests
<b>3.</b>	<b>Joints</b>	<b>2</b>	<b>0,5</b>	<b>15</b>	<b>11</b>	
<b>3.1.</b>	<b>Classification of bony joints</b>	<b>1</b>	<b>0,5</b>	<b>2</b>	<b>1</b>	
<b>3.2.</b>	<b>Joints of the axial skeleton</b>	<b>1</b>		<b>3</b>	<b>2</b>	
<b>3.3.</b>	<b>Joints of the appendicular skeleton</b>			<b>10</b>	<b>8</b>	
	General anatomy of the joints	2	0,5	-	2	Interviews; tests, essays
	Joints. Classification of bony joints. Synovial joints and their classification. Vertebral joints. Vertebral column as a whole. Joints of the thorax. Thorax as a whole. Roentgen anatomy of the vertebral column and thorax. Joints of skull. Temporomandibular joint	-	-	3	2	Interviews, tests, control questioning, essays, electronic tests
	Joints of upper limb. Joints of pectoral girdle. Shoulder (glenohumeral) joint. Elbow joint. Articulations between the bones of the forearm. Radiocarpal (wrist) joint and joints of hand. Roentgen anatomy of the upper limb joints	-	-	3	2	Interviews, tests, control questioning.
	Joints of the lower limb. Joints of the pelvic girdle. Pelvis as a whole. Hip joint. Knee joint. Articulations between the bones of leg. Roentgen anatomy of the pelvic girdle joints, hip and knee joints	-	-	3	2	Interviews, tests, control questioning
	Ankle joint and joints of foot. Foot as a whole. Roentgen anatomy of the foot joints	-	-	3	2	Interviews, tests, control questioning, electronic tests.
	Final session: «Bones and joints»	-	-	3	2	Colloquium



4.	<b>Muscular system</b>	2	1	24	19
4.1.	<b>Muscle tissue. Muscle as an organ</b>	1	1	2	
4.2.	<b>Functional anatomy of the muscles</b>	1		22	15
	General anatomy of skeletal muscles	2	1	-	2
	Structure and classification of muscles. Muscles and fasciae of the back and thorax. Diaphragm. Anatomical predispositions to diaphragmatic hernias	-	-	3	2
	Muscles and fasciae of the abdomen. Linea alba. Rectus sheath. Inguinal canal. «Weak» places in the abdominal wall as the anatomical predispositions to herniation	-	-	3	2
	Muscles and fasciae of neck. Topographic anatomy of the neck. Muscles of the head: facial and masticatory muscles. Fasciae of the head	-	-	3	2
	Muscles and fasciae of the shoulder girdle and arm. Axillary fossa and axillary cavity. Topo-graphic anatomy of the arm	-	-	3	2
	Muscles and fasciae of the forearm and hand. Topographic anatomy of the forearm and hand	-	-	3	2
	Muscles and fasciae of the thigh. Topographic anatomy of the buttock and thigh. Femoral canal. Anatomical predispositions for femoral hernias	-	-	3	2
	Muscles and fasciae of the leg and foot. Topographic anatomy of the leg and foot	-	-	3	2
	Final session: «Muscular system»	-	-	3	4
					Colloquium Credit

		<b>2nd semester</b>			
		<b>10</b>	<b>3,5</b>	<b>85</b>	<b>103</b>
<b>5.</b>	<b>Visceral systems</b>	<b>4</b>	<b>2</b>	<b>40</b>	<b>49</b>
<b>5.1.</b>	<b>Digestive system</b>	<b>1</b>	<b>0,5</b>	<b>18</b>	<b>19</b>
	Introduction into splanchnology. Development and functional anatomy of the digestive and respiratory system organs	2	0.5	-	1
	Overview of the digestive (alimentary) system organs. Mouth, oral cavity. Lips, cheeks, hard and soft palate. Teeth: deciduous and permanent	-	-	2	3
	Tongue. Major and minor salivary glands; topography. Pharynx: topography and structure. Pharyngeal lymphoid ring	-	-	3	3
	Esophagus: topography and structure. Roentgen anatomy of the esophagus. Abdominal regions. Abdominal and pelvic cavities and their walls. Peritoneal cavity. Stomach: topography and structure. Roentgen anatomy of the stomach	-	-	2	3
	Small intestine: topography, structure, Roentgen anatomy	-	-	3	3
	Large intestine: topography, structure, Roentgen anatomy	-	-	2	3
	Liver: topography, structure. Biliary ducts and gallbladder: topography, structure. Pancreas: topography, structure. Spleen: topography, structure	-	-	3	3
<b>5.7.</b>	<b>Abdominopelvic cavity</b>			<b>2</b>	<b>3</b>
	Peritoneum. Topography of the peritoneum in the abdominal and pelvic cavities. Development of the alimentary system. Anomalies	-	-	2	3
<b>5.2.</b>	<b>Respiratory system</b>	<b>1</b>	<b>0,5</b>	<b>6</b>	<b>8</b>
<b>5.3.</b>	<b>Thoracic cavity</b>			<b>2</b>	<b>1</b>
	Respiratory system. Nose. Nasal cavity. Paranasal sinuses. Larynx: topography, structure of the wall. Laryngeal cavity	-	-	3	3
	Trachea, bronchi, and lungs: topography, structure. Projection lines on the thoracic wall	-	-	2	3



	Thoracic cavity. Pleura. Pleural cavity, pleural sinuses. Projections of the lung borders and of parietal pleura reflections on the thoracic wall. Mediastinum. Roentgen anatomy of the trachea, bronchi, lungs. Development of organs of the respiratory system. Anomalies	-	-	3	3	Interviews, tests, control questioning
<b>5.4.</b>	<b>Urinary system</b>	<b>1</b>	<b>0,5</b>	<b>4</b>	<b>4</b>	
	Development and functional anatomy of the urinary and genital system organs	2	1	-	1	Electronic tests, paper test, interview, essays
	Urinary system. Kidney: topography, structure. Ureter, urinary bladder: topography, structure. Roentgen anatomy of the urinary organs. Development of the urinary organs. Anomalies	-	-	2	3	Interviews; tests; control questioning; electronic tests
<b>5.5.</b>	<b>Genital (reproductive) systems</b>	<b>1</b>	<b>0,5</b>	<b>6</b>	<b>8</b>	
<b>5.6.</b>	<b>Perineum</b>			<b>2</b>	<b>1</b>	
	Male genital system. Male internal genitalia. Testis, epididymis, ductus (vas) deferens: topography and structure. Spermatic cord. Descent of testes and their coverings formation. Prostate. Seminal gland (seminal vesicle). Bulbo-urethral gland. Male external genitalia: penis, scrotum. Male urethra. Development of male genital organs. Anomalies	-	-	3	3	Interviews, tests, control questioning
	Female genital system. Female internal genitalia. Ovary, epoophoron and paraophoron, uterine (Fallopian) tubes, uterus, vagina: topography, structure. Roentgen anatomy	-	-	2	3	Interviews, tests, control questioning
	Female external genitalia. Pudendum (vulva). Female urethra. Perineum and pelvic diaphragm: muscles and fasciae. Ischioanal fossa. Gender differences in the structure of the perineum. Development of female genital organs. Anomalies	-	-	3	3	Interviews, tests, control questioning
<b>6.</b>	<b>Endocrine glands</b>			<b>2</b>	<b>9</b>	
	Endocrine glands: sources of development, topography, structure	-	-	2	3	Interviews, tests, control questioning, essays, reports in laboratory classes;



Final session: «Visceral systems», «Endocrine glands»		5	6	Colloquium	
<b>7.</b>	<b>Cardiovascular system</b>				
<b>7.1.</b>	<b>Cardiovascular system: heart, arteries, blood vessels of the microcirculatory bed, veins</b>	<b>1</b>	<b>0,5</b>	<b>2</b>	
<b>7.2.</b>	<b>Heart. Pericardium</b>			<b>6</b>	<b>7</b>
	Introduction into angiology. Development and functional anatomy of the heart and blood vessels. Features of blood supply to organs of the thoracic, abdominal and pelvic cavities	2	0.5	-	1
	Cardiovascular system. Heart. Structure of the heart chambers. Structure of the wall of the heart. Conducting system of the heart. Systemic and pulmonary circulation	-	-	3	3
	Topography of the heart. Projection of the heart valves on the anterior wall of the chest, and their auscultation points. Pericardium. Roentgen anatomy of the heart. Development of the heart and its anomalies. Vessels of the systemic and pulmonary circulation. Aorta and its parts. Arteries and veins of heart	-	-	2	3
<b>7.3</b>	<b>Arteries</b>	<b>1</b>		<b>20</b>	<b>23</b>
	Branches of the aortic arch. Brachiocephalic trunk. Common carotid artery. External carotid artery: anterior, middle, posterior groups of branches	-	-	3	3
	Internal carotid artery and its braches. Subclavian artery and its branches.	-	-	2	3
	Axillary and brachial arteries and their branches	-	-	3	3
	Ulnar, radial arteries and their branches. Blood supply to the hand	-	-	2	3
	Descending aorta. Branches of the thoracic aorta. Arterial blood supply to the organs of the thoracic cavity. Branches of the abdominal aorta. Arterial blood supply to the organs of the abdominal cavity	-	-	3	3
	Common iliac artery. External and internal iliac arteries and their	-	-	2	2

	branches. Blood supply to the pelvic organs						questioning, electronic tests
	Femoral and popliteal arteries, their branches	-	-	3	3	3	Interviews, tests, control questioning, electronic tests
	Anterior and posterior tibial arteries. Arteries of the foot	-	-	2	3	3	Interviews, tests, control questioning, electronic tests
<b>4.4.</b>	<b>Veins</b>	<b>2</b>	<b>0,5</b>	<b>8</b>	<b>12</b>	<b>1</b>	
	Functional anatomy of the venous system	2	0,5	-	1	1	Interviews; tests, essays
	System of the superior vena cava: brachiocephalic veins, jugular veins. Veins of the upper limb. Veins of the body walls: azygos and hemiazygos veins	-	-	3	3	3	Interviews, tests, control questioning, electronic tests
	System of the inferior vena cava: common, external and internal iliac veins, veins of the lower limb. Hepatic portal vein	-	-	2	2	2	Interviews, tests, control questioning, electronic tests
	Portocaval and cavocaval anastomoses. Fetal circulation.	-	-	3	2	2	Interviews, tests, control questioning, electronic tests
	Anatomical predispositions of the congenital heart defects	-	-	3	2	2	Interviews, tests, control questioning, electronic tests
<b>7.5.</b>	<b>Lymphatic trunks and ducts</b>	<b>2</b>	<b>0,5</b>	<b>6</b>	<b>12</b>	<b>1</b>	
<b>8.</b>	<b>Lymphoid system</b>	<b>2</b>	<b>0,5</b>	<b>1</b>	<b>12</b>	<b>1</b>	
	Functional anatomy of the lymphatic system. Lymphoid system	2	0.5	-	1	1	Electronic tests, paper test, interview, essays
	Primary and secondary lymphoid organs. Lymphatic system (general information). Lymphatic vessels and lymph nodes of head, neck, and upper limbs. Pathways of the lymph drainage from the head, neck and upper limbs	-	-	2	3	3	Interviews, tests, control questioning, essays, electronic tests
	Lymphatic vessels and nodes of the chest, abdomen, pelvis, and lower limbs. Pathways of the lymph drainage from the walls and organs of the chest, abdomen, pelvis and lower limbs	-	-	3	2	2	Interviews, tests, control questioning, electronic tests
	Final lesson on sections: «Cardiovascular System», «Lymphoid system»	-	-	5	6	6	Colloquium Credit



		3 semester				
		10	3,5	54	44	
<b>9.</b>	<b>Nervous system</b>	<b>8</b>	<b>3</b>	<b>44</b>	<b>35</b>	
<b>9.1.</b>	<b>Nervous system and its functions</b>	<b>1</b>		<b>2</b>		
<b>9.2.</b>	<b>Central nervous system</b>	<b>3</b>	<b>1,5</b>	<b>18</b>	<b>11</b>	
	Introduction to Neurology. Functional anatomy of the spinal cord and brainstem	2	1	-	1	
	Central nervous system. Spinal cord: development, topographic anatomy, external and internal structure. Meninges of the spinal cord..Spinal cord: development, topographic anatomy, external and internal structure. Meninges of the spinal cord	-	-	3	1	
	Brain: development and parts. Medulla oblongata: external and internal structure. Pons and cerebellum: external and internal structure	-	-	3	2	
	Fourth ventricle. Rhomboid fossa. Projection of the nuclei of the cranial nerves on the rhomboid fossa. Mesencephalon: external and internal structure. Aqueduct of the midbrain.	-	-	3	2	
	Functional anatomy of the diencephalon and telencephalon. Blood supply to the brain	2	0.5	-	1	
	Diencephalon: external and internal structure. Third ventricle. Telencephalon: sulci and gyri of the superolateral, medial and inferior surfaces of the hemi-spheres. Distribution of functions in the cerebral cortex	-	-	3	2	
	Olfactory brain (Rhinencephalon). Lateral ventricles. Basal nuclei and white matter of the telencephalon. Meninges of the brain. Cerebrospinal fluid: formation and outflow pathways. Attachment of the cranial nerves to the brain and exit from the skull. Conduction pathways (tracts) of the brain and spinal cord	-	-	3	2	
<b>10.</b>	<b>Sense organs</b>	<b>2</b>	<b>0,5</b>	<b>9</b>	<b>9</b>	
<b>11.</b>	<b>Integument</b>			<b>1</b>		
<b>10.1.</b>	<b>Anatomic and functional characteristics of the sense organs</b>	<b>2</b>		<b>2</b>		



<b>10.2.</b>	<b>Eye and accessory visual structures</b>				<b>3</b>	
<b>10.3.</b>	<b>Ear</b>				<b>3</b>	
<b>10.4.</b>	<b>Olfactory organ. Gustatory organ</b>				<b>1</b>	
	Functional anatomy of the sense organs	2	0,5	-	1	Electronic tests, paper test, individual interview, checking up essays
	Sense organs. Integument, derivatives of skin. Visual apparatus: structure of the eyeball. Accessory visual apparatus of eye. Visual conduction pathway	-	-	-	3	Interviews, tests, control questioning, electronic tests
	Auditory and vestibular apparatus. External and middle ear. Internal ear. Conduction pathways of the auditory and vestibular analyzers	-	-	-	3	Interviews, tests, control questioning, electronic tests
	Final session: «Central nervous system. Sense organs»	-	-	-	3	Colloquium
<b>9.3.</b>	<b>Peripheral Nervous System</b>	<b>2</b>	<b>0,5</b>		<b>18</b>	<b>15</b>
	Peripheral Nervous System. Functional anatomy of the spinal and cranial nerves	2	0,5	-	-	1
	Peripheral Nervous System. Cranial nerves: 0, I, II, III, IV, V, VI. Organ of smell	-	-	-	3	3
	Facial (VII) nerve, vestibulocochlear (VIII) and glossopharyngeal (IX) nerves	-	-	-	3	2
	Vagus (X) nerve. Gustatory organ. Accessory (XI) and hypoglossal (XII) nerves	-	-	-	3	2
	Spinal nerves: posterior and anterior branches of spinal nerves. Cervical plexus. Brachial plexus	-	-	-	3	3
	Intercostal nerves (anterior branches of thoracic spinal nerves). Lumbar plexus	-	-	-	3	2
	Sacral and coccygeal plexus	-	-	-	3	2

9.4.	<b>Autonomic Nervous System</b>	2	1	6	9
	General characteristics of structure and function of the autonomic nervous system. Innervation of organs and blood vessels	2	1	-	1
	Autonomic part of the nervous system. General principles of its organization. Sympathetic part of the autonomic nervous system	-	-	3	2
	Parasympathetic part of the autonomic nervous system. Autonomic plexuses and ganglia of the head, neck, chest, abdomen and pelvis. Innervation of the internal organs	-	-	3	2
	Final session: «Peripheral Nervous System», «Autonomic Nervous System»	-	-	6	4
	<b>Total amount of hours</b>	<b>26</b>	<b>9</b>	<b>196</b>	<b>192</b>



## INFORMATION AND INSTRUCTIONAL UNIT

### LITERATURE

#### **Basic (relevant):**

1. Sapin, M. R., Kolesnikov, L. L., Nikitjuk, D. B. Textbook of human anatomy: For medical students. In 2 volumes. V.1 / Ed. by M. R. Sapin. – Moscow : New Wave Publisher LLC, 2019. – 416 p: ill.
2. Sapin, M. R., Kolesnikov, L. L., Nikitjuk, D. B. Textbook of human anatomy: For medical students. In 2 volumes. V.2 / Ed. by M. R. Sapin. – Moscow : New Wave Publisher LLC, 2019. – 480 p: ill.
3. Netter Frank, H. Atlas of human anatomy / Netter Frank H. – Philadelphia : Elsevier, 2019. – 578 p.: ill.

#### **Additional:**

4. Строение внутренних органов человека = Structure of Human Internal organs : учеб.-метод. пособие / Трушель Н. А., Арден Ф. А.– Минск : БГМУ, 2022. – 90 с.
5. Функциональная анатомия глаза и связанных с ним структур = Functional anatomy of eye and related structure : учеб.-метод. пособие/ Гусева Ю. А., Денисов С. Д. – Минск : БГМУ, 2020. –30 с.
6. Брюшина = Peritoneum : учеб.-метод. пособие/ Жарикова О. Л. – Минск : БГМУ, 2020. – 16 с.
7. Анатомия внутренних органов = Anatomy of internal organs: учеб.-метод. пособие/ Жарикова, О. Л. – Минск : БГМУ, 2020. – 56 с.
8. Иннервация скелетных мышц тела человека: учеб.-метод. пособие/ Трушель Н. А. [и др.] – Минск : БГМУ, 2020. – 44 с.
9. Соединения тела человека (краткий курс) = Joints of human body (Brief course) : учеб.-метод. пособие / Пасюк А. А., Жарикова О. Л., Арден Ф. А.– Минск : БГМУ, 2021. – 47 с.
10. Артерии большого круга кровообращения = Arteries of the systemic circulation : учеб.-метод. пособие / Жарикова О. Л., Чайка Л. Д. – Минск : БГМУ, 2021. – 48 с.
11. Вены большого круга кровообращения = Veins of the systemic circulation : учеб.-метод. пособие / Жарикова О. Л., Чайка Л. Д. – Минск : БГМУ, 2021. – 40 с.
12. Лимфатические пути. Лимфоотток от органов и частей тела = Lymphatic pathways. Lymphatic drainage of organs and body parts: учеб.-метод. пособие/ О. Л. Жарикова, Л. Д. Чайка, Л. А. Давыдова – Минск: БГМУ, 2019. – 43 с.
13. Соматические проводящие пути центральной нервной системы = Somatic conduction pathways of the central nervous system : учеб.-метод. пособие/ О. Л. Жарикова, В. В. Руденок – Минск : БГМУ, 2019. –31 с.
14. Terminologia Anatomica. 2nd ed. 2019.  
<https://www.iffa.net/committees/anatomical-terminology-ffpat>.
15. Gray's atlas of anatomy / R. L. Drake, [et al.]. 2nd ed. – 2015.



16. Moore, K. L. Clinically oriented anatomy / K. L. Moore. Wolters Kluwer, 2017. - 1168 p.

17. Жарикова, О. Л. Anatomy of cranial and spinal nerves = Анатомия черепных и спинномозговых нервов : учебно-методическое пособие / О. Л. Жарикова. – Минск : БГМУ, 2022. – 64 с.

**METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE**

The hours allocated for self-study can be used for:

- preparation for laboratory classes;
- study of lecture material (viewing video lectures, multimedia presentations);
- preparation for colloquia, tests and exams in the discipline;
- working on topics (questions) submitted for selfstudy;
- study of topics and problems that are not subject to lectures and laboratory classes;
- solution of situational problems;
- performance of research and creative tasks;
- preparation of case reports, abstracts, presentations;
- preparation of practical tasks;
- preparation of information and demonstration materials (stands, posters, tables);
- preparation of tests for the organization of mutual assessment;
- making educational anatomical specimens.

**METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED INDEPENDENT STUDENT WORK IN THE ACADEMIC DISCIPLINE**

Main forms of supervised student independent work:

- reports writing and presentation;
- study of topics and problems not covered in the lectures;
- study of topics in e-test;
- computer testing.

Control of supervised independent student work is carried out in the form of:

- paper test;
- final class, colloquium in the form of an oral interview, written work, test;
- reports topic discussion;
- assessment of an oral answer to the question, presentation;
- individual interview.

**LIST OF AVAILABLE DIAGNOSTIC TOOLS**

The following forms are used for competences assessment:

**Oral form:**

interviews;  
colloquiums;  
reports in laboratory classes;  
credit;  
examination.

**Written form:**

tests;  
control questioning;  
essays.

**Technical form:**

electronic tests.

**LIST OF AVAILABLE TEACHING METHODS**

Traditional method (lecture, laboratory practicals);  
Active (interactive) methods: Problem-Based Learning (PBL).

**LIST OF PRACTICAL SKILLS**

1. Demonstration of anatomical structures on the corpse, its parts, organs and other visual teaching aids.
2. Positioning organs considering their location in the human body.
3. Application of anatomical terminology in the description of body parts, organs, anatomical formations.
4. Detection of bone protrusions and projection of internal organs, large vessels and nerves on the surface of the human body.
5. Demonstration of organs and their parts on radiographs.

**LIST OF EQUIPMENT USED**

Anatomical specimens (cadaver material), models, tables, museum specimens, radiographs, atlases, multimedia presentation, video lecture, educational videos, anatomical table.

**LIST OF LECTURES****1st semester**

1. Introduction to anatomy. General anatomy of the skeletal system.
2. General anatomy of the joints.
3. General anatomy of skeletal muscles.

**2nd semester**

1. Introduction into splanchnology. Development and functional anatomy of the organs of the digestive and respiratory systems.
2. Development and functional anatomy of the organs of the urinary and genital systems.



3. Introduction into angiology. Development and functional anatomy of the heart and blood vessels. Features of blood supply to the organs of the thoracic, abdominal and pelvic cavities.
4. 4). Functional anatomy of the venous system.
5. Functional anatomy of the lymphatic system. Lymphoid system.

### **3rd semester**

1. Introduction to neurology. Functional anatomy of the spinal cord and brainstem.
2. Functional anatomy of the diencephalon and telencephalon. Blood supply to the brain.
3. Functional anatomy of the sense organs.
4. Peripheral nervous system. Functional anatomy of the spinal and cranial nerves.
5. General characteristics of structure and function of the autonomic nervous system. Innervation of the organs and blood vessels.

## **LIST OF LABORATORY STUDIES**

### **1st semester**

1. Study of anatomy. Anatomical terminology. Terms of position and direction, axes and planes. Axial and appendicular skeleton. Vertebral column. Thoracic, cervical and lumbar vertebrae. Sacrum and coccyx. Skeleton of the thorax. Ribs and sternum.
2. Cranium (skull): neurocranium and viscerocranium (facial skeleton). Bones of the neurocranium: frontal, parietal, occipital, sphenoid, ethmoid.
3. Temporal bones. Bones of the facial skeleton: maxilla, mandible, palatine bone, inferior nasal concha, vomer; nasal, lacrimal, zygomatic, and hyoid bones.
4. Cranium as a whole. Paranasal sinuses. Cranium of a newborn. Age and gender characteristics of the cranium. Development of the cranium and its anomalies. Roentgen anatomy of the cranium.
5. Bones of the upper limb: pectoral (shoulder) girdle and free part of the upper limb. Roentgen anatomy of the upper limb bones. Anatomical predispositions to fractures of the upper limb bones.
6. Bones of the lower limb. Pelvic girdle and free part of the lower limb. Roentgen anatomy of the bones of the lower limb. Anatomical predispositions to fractures of the bones of the lower limb.
7. Joints. Classification of bony joints. Synovial joints and their classification. Vertebral joints. Vertebral column as a whole. Joints of the thorax. Thorax as a whole. Roentgen anatomy of the vertebral column and thorax. Joints of skull. Temporomandibular joint.
8. Joints of the upper limb. Joints of the pectoral girdle. Shoulder (glenohumeral) joint. Elbow joint. Articulations between the bones of the forearm.

Radiocarpal (wrist) joint and joints of hand. Roentgen anatomy of the joints of the upper limb.

9. Joints of the lower limb. Joints of the pelvic girdle. Pelvis as a whole. Hip joint. Knee joint. Articulations between the bones of the leg. Roentgen anatomy of the joints of the pelvic girdle, hip and knee joints.

10. Ankle joint and joints of foot. Foot as a whole. Roentgen anatomy of the foot joints.

11. Final session: «Bones and joints».

12. Structure and classification of muscles. Muscles and fasciae of back and thorax. Diaphragm. Anatomical predispositions to diaphragmatic hernias.

13. Muscles and fasciae of the abdomen. Linea alba. Rectus sheath. Inguinal canal. «Weak» places in the abdominal wall as anatomical predispositions to herniation.

14. Muscles and fasciae of the neck. Topographic anatomy of the neck. Muscles of the head: facial and masticatory muscles. Fasciae of the head.

15. Muscles and fasciae of the shoulder girdle and the arm. Axillary fossa and axillary cavity. Topographic anatomy of the arm.

16. Muscles and fasciae of the forearm and hand. Topographic anatomy of the forearm and hand.

17. Muscles and fasciae of the thigh. Topographic anatomy of the buttock and thigh. Femoral canal. Anatomical predispositions for femoral hernias.

18. Muscles and fasciae of the leg and foot. Topographic anatomy of the leg and foot.

19. Final session: «Muscles».

### **2nd semester**

1. Overview of the digestive (alimentary) system organs. Mouth, oral cavity. Lips, cheeks, hard and soft palate. Teeth: deciduous and permanent.

2. Tongue. Major and minor salivary glands: topography. Pharynx: topography and structure. Pharyngeal lymphoid ring.

3. Esophagus: topography and structure. Roentgen anatomy of the esophagus. Abdominal regions. Abdominal and pelvic cavities and their walls. Peritoneal cavity. Stomach: topography and structure. Roentgen anatomy of the stomach.

4. Small intestine: topography, structure, Roentgen anatomy.

5. Large intestine: topography, structure, Roentgen anatomy.

6. Liver: topography, structure. Biliary ducts and gallbladder: topography, structure. Pancreas: topography, structure. Spleen: topography, structure.

7. Peritoneum. Topography of the peritoneum in the abdominal and pelvic cavities. Development of the alimentary system. Anomalies.

8. Respiratory system. Nose. Nasal cavity. Paranasal sinuses. Larynx: topography, structure of the wall. Laryngeal cavity.

9. Trachea, bronchi, and lungs: topography, structure. Projection lines on the thoracic wall.



10. Thoracic cavity. Pleura. Pleural cavity, pleural sinuses. Projections of the lung borders and of parietal pleura reflections on the thoracic wall. Mediastinum. Roentgen anatomy of the trachea, bronchi, lungs. Development of the respiratory system organs. Anomalies.

11. Urinary system. Kidney: topography, structure. Ureter, urinary bladder: topography, structure. Roentgen anatomy of the urinary organs. Development of the urinary organs. Anomalies.

12. Male genital system. Male internal genitalia. Testis, epididymis, ductus (vas) deferens: topography and structure. Spermatic cord. Descent of testes and their coverings formation. Prostate. Seminal gland (seminal vesicle). Bulbo-urethral gland. Male external genitalia: penis, scrotum. Male urethra. Development of the male genital organs. Anomalies.

13. Female genital system. Female internal genitalia. Ovary, epoophoron and paraophoron, uterine (Fallopian) tubes, uterus, vagina: topography, structure, Roentgen anatomy.

14. Female external genitalia. Pudendum (vulva). Female urethra. Perineum and pelvic diaphragm: muscles and fasciae. Ischioanal fossa. Gender differences in the structure of the perineum. Development of the female genital organs. Anomalies.

15. Endocrine glands: sources of development, topography, structure.

16. Final lesson on the section «Visceral systems», «Endocrine Glands».

17. Cardiovascular system. Heart. Structure of the heart chambers. Structure of the heart wall. Conducting system of the heart. Systemic and pulmonary circulation.

18. Topography of the heart. Projection of the heart valves on the anterior wall of the chest, and their auscultation points. Pericardium. Roentgen anatomy of the heart. Development of the heart and its anomalies. Vessels of the systemic and pulmonary circulation. Aorta and its parts. Arteries and veins of the heart.

19. Branches of the aortic arch. Brachiocephalic trunk. Common carotid artery. External carotid artery: anterior, middle, posterior groups of branches.

20. Internal carotid artery and its branches. Subclavian artery and its branches.

21. Axillary and brachial arteries and their branches.

22. Ulnar, radial arteries and their branches. Blood supply to the hand.

23. Descending aorta. Branches of the thoracic aorta. Arterial blood supply to organs of the thoracic cavity. Branches of the abdominal aorta. Arterial blood supply to organs of the abdominal cavity.

24. Common iliac artery. External and internal iliac arteries and their branches. Blood supply to the pelvic organs.

25. Femoral and popliteal arteries, their branches.

26. Anterior and posterior tibial arteries. Arteries of the foot.

27. System of the superior vena cava: brachiocephalic veins, jugular veins. Veins of the upper limb. Veins of the body walls: azygos and hemiazygos veins.

28. System of the inferior vena cava: common, external and internal iliac veins, veins of the lower limb. Hepatic portal vein.

29. Portocaval and cavo-caval anastomoses. Fetal circulation. Anatomical predispositions to the congenital heart defects.

30. Primary and secondary lymphoid organs. Lymphatic system (general information). Lymphatic vessels and nodes of the head, neck, and upper limbs. Pathways of the lymph drainage from the head, neck and upper limbs.

31. Lymphatic vessels and nodes of the chest, abdomen, pelvis, and lower limbs. Pathways of the lymph drainage from the walls and organs of the chest, abdomen, pelvis and lower limbs.

32. Final session: «Cardiovascular System», «Lymphoid System».

### **3rd semester**

1. Central nervous system. Spinal cord: development, topographic anatomy, external and internal structure. Meninges of the spinal cord.

2. Brain: development and parts. Medulla oblongata: external and internal structure. Pons and cerebellum: external and internal structure.

3. Fourth ventricle. Rhomboid fossa. Projection of the nuclei of the cranial nerves on the rhomboid fossa. Mesencephalon: external and internal structure. Aqueduct of the midbrain.

4. Diencephalon: external and internal structure. Third ventricle. Telencephalon: sulci and gyri of the superolateral, medial and inferior surfaces of the hemi-spheres. Distribution of functions in the cerebral cortex.

5. Olfactory brain (Rhiencephalon). Lateral ventricles. Basal nuclei and white matter of the telencephalon. Meninges of the brain. Cerebrospinal fluid: formation and outflow pathways. Attachment of the cranial nerves to the brain and exit from the skull. Conduction pathways (tracts) of the brain and spinal cord.

6. Sense organs. Integument, derivatives of skin. Visual apparatus: structure of the eyeball. Accessory visual structures. Visual pathway.

7. Auditory and vestibular apparatus. External and middle ear. Internal ear. Auditory and vestibular pathways.

8. Final session: «Central nervous system. Sense organs».

9. Peripheral nervous system. Cranial nerves: 0, I, II, III, IV, V, VI. Olfactory organ.

10. Facial (VII) nerve, vestibulocochlear (VIII) and glossopharyngeal (IX) nerves.

11. Vagus (X) nerve. Gustatory organ. Accessory (XI) and hypoglossal (XII) nerves.

12. Spinal nerves: posterior and anterior branches of spinal nerves. Cervical plexus. Brachial plexus.

13. Intercostal nerves (anterior branches of thoracic spinal nerves). Lumbar plexus.

14. Sacral and coccygeal plexus.

15. Autonomic part of the nervous system. General principles of its organization. Sympathetic part of the autonomic nervous system.



16. Parasympathetic part of the autonomic nervous system. Autonomic plexuses and ganglia of the head, neck, chest, abdomen and pelvis. Innervation of the internal organs.

17. Final session: «Peripheral Nervous System», «Autonomic Nervous System».

### **EXAMPLE TOPICS OF ABSTRACT WORKS**

1. Development of skeletal bones and joints in prenatal ontogenesis.
2. Development of skeletal muscles in prenatal ontogenesis.
3. Anomalies and malformations of skeletal muscles.
4. Development of the organs of the digestive system in prenatal ontogenesis.
5. Development of the organs of the respiratory system. in prenatal ontogenesis.
6. Development of the organs of the urinary system in prenatal ontogenesis.
7. Anomalies and malformations of the organs of the urinary system.
8. Development of the organs of the reproductive system in prenatal ontogenesis.
9. Anomalies and malformations of the organs of the reproductive system.
10. Development of the cardiovascular system in prenatal ontogenesis.
11. Variants of arterial branching.
12. Development of the central nervous system in prenatal ontogenesis.
13. Anomalies and malformations of the nervous system.

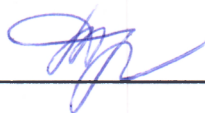
**PROTOCOL OF THE CURRICULUM APPROVAL  
BY OTHER DEPARTMENTS**

Title of the discipline requiring approval	Department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol # )
1. Normal Physiology	Normal Physiology	none	May 22, 2023, protocol # 12
2. Histology, Cytology, Embryology	Histology, Cytology, and Embryology	none	May 22, 2023, protocol # 12
3. Topographic Anatomy and Operative Surgery	Topographic Anatomy and Operative Surgery	none	May 22, 2023, protocol # 12



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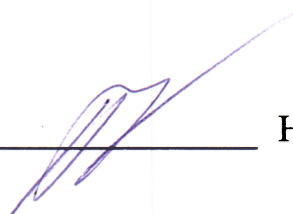
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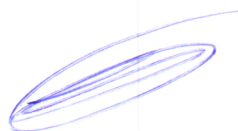


H.A.Pasiuk

Curriculum content, composition and the accompanying documents comply with the established requirements.

Dean of the Medical Faculty for International Students of the educational institution «Belarusian State Medical University»

27.06. 2023



O.S.Ishutin

Methodologist of the educational institution «Belarusian State Medical University»

27.06. 2023



S.V.Zaturanova