

**Danylo Halytsky Lviv National Medical University**

Department of Normal Anatomy



APPROVED  
First Pro-rector for scientific  
and pedagogical work  
Assoe. Prof. Iryna SOLONYNKO

*Iryna Solonyenko*  
"27" 06 2023

**ACADEMIC PROGRAM OF THE DISCIPLINE**

Human anatomy

OK — 11

**for the training specialist second (master's) level of higher education  
22 area of expertise "Healthcare"  
222 specialty "Medicine"**

Discussed and approved  
at the methodical meeting of the  
department of Normal anatomy  
June 12, 2023  
(minutes №12)  
Head of Department  
Prof. Lesia MATESHUK-VATSEBA

*Lesia Mateshuk-Vatseba*

Approved  
at cycle methodic committee on  
biomedical courses  
June 22, 2023  
(minutes № 4)  
Head of Committe  
Prof. Alexander LUTSYK

*Alexander Lutsyk*

Working curriculum in the discipline "Human Anatomy" for first and second year students of the Faculty of Medicine, majoring in 222 "Medicine".

Composed by:

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Besedina A.S., associated professor of the department of normal anatomy Danylo Halytsky Lviv National Medical University, Ph.D.

Podoliuk M.V., assistant of professor of the department of normal anatomy Danylo Halytsky Lviv National Medical University, on the basis of the sample program of the discipline "Human Anatomy" and the curriculum approved by the profile methodical commission (minutes №12\_ from\_ June12, 2023)

Reviewers:

Associate Professor of the Department of histology, cytology and embryology, Danylo Halytsky Lviv National Medical University, Head of the department Chelpanova I.V.

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Head of the department of normal anatomy,  
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## INTRODUCTION

Program of study discipline "**Human Anatomy**" composed according to the standard of higher education in Ukraine (hereinafter - the Standard) the second (master's) level of higher education (Name of higher education)

22 area of expertise "Healthcare"

222 specialty "Medicine".

specialization (s) \_\_\_\_.

### The Description of the Subject (Summary)

The working program in the discipline "Human Anatomy" for students of I course of the dentistry faculty in the specialty 222 "Medicine" is based on the Educational-professional program "Medicine" of the second (major) level of higher education in specialty 222 "Medicine", area 22 Healthcare, approved by the Academic Council of Danylo Halytsky Lviv National Medical University on February 15, 2023, protocol № 1-VR, and Regulations about organization of the educational process at Danylo Halytsky Lviv National Medical University, approved by the Academic Council and Rector of the University on June 23, 2021, order № 2020-z. The purpose of the Regulation is to standardize the content, scope, sequence and organizational forms of study of the discipline by students, as well as forms and means of current and final control of knowledge. Occur in 1-st, 2-nd and 3-rd semester, according to the educational plan of normal anatomy studying.

The subject of the discipline is the structure of the human body and its parts in connection with their development and function. There are the following chapters of the subject: osteology (the study of bones), arthrology (the study of bone connections), myology (the study of muscles), splanchnology (the study of the visceral organs), neurology (the study of the nervous system) and angiology (the study of cardiovascular system).

Anatomy belongs to the biological sciences, together with histology and embryology it is combined into morphology, on which all other medical, theoretical and clinical disciplines are based. The science of embryo development, embryology, is also closely related to anatomy, as the structures of the organism are studied in the process of their origin and development. The task of anatomy as a science is a systematic approach to the description of the shape, structure and topography of parts and organs of the body in unity with the functions performed, taking into account age, gender and individual characteristics. Anatomy helps to know the main stages of human development in the process of evolution, the formation of the organism in the environment, the peculiarities of the structure of individual organs and systems at different ages.

Structure of the subject	Number of credits, hours, including			Year Semester	Type of control	
	Total	Classroom study				Self study work
		Lectures	Practical lessons			
<b>Name of study discipline:</b> «Human anatomy» Thematic moduls 12	<b>15,5 credits /</b> <b>465 h</b>	<b>32</b>	<b>200</b>	<b>233</b>	<b>1-2 (I, II, III semesters)</b> <b>Final control Exam</b>	
<b>I, II,III semesters</b>						
Thematic moduls 1-3	<b>4,5 credits /</b> <b>135 h</b>	<b>6</b>	<b>48</b>	<b>81</b>	<b>I semester</b>	
Thematic moduls 4-9	<b>7,5 credits /</b> <b>225 h</b>	<b>16</b>	<b>110</b>	<b>99</b>	<b>II semester</b> <b>Final control</b>	
Thematic moduls 10-12	<b>3,5 credits /</b> <b>105 h</b>	<b>10</b>	<b>42</b>	<b>53</b>	<b>III semester</b> <b>Exam</b>	

Human Anatomy as an academic discipline is based on a study of medical biology, histology, cytology and embryology, biophysics, Latin and integrates these disciplines.

**The subject of Human Anatomy course is to learn structure of human organism, systems it consist of, organs and its main parts in relationships between development and functions.**

**Interdisciplinary links:** topographic anatomy and operative surgery, histology, normal physiology, surgery, therapy, radiology, neurology, dentistry ect.

### 1. The Aims and Objectives of the subject

**1.1.** The overall aim of the teaching process of Human Anatomy is determined by the goals of the programme outlining educational-professional training of higher medical institutions, as well as by the content of systemic

competence and practical skills required for a doctor. The knowledge received during the study of Human Anatomy is basic for a range of subjects providing both natural-science (NS unit) and professional-practical (PP unit) preparation.

**1.2.** The ultimate goals of the course Human anatomy:

- Analyze information about the structure of human body, system it consists of, organs and tissues;
- Demonstrate the moral and ethical attitude a living person and his/her body as an object of anatomical and clinical study.
- Identify topographic anatomical relationships between organs and human systems;
- Explain the patterns of prenatal and early postnatal development of the human organs, versions of organs variability, malformations;
- Interpret sex, age and individual features of the structure of the human body;
- Provide unity and interdependence of structures and functions of human organs, their variability under the influence of environmental factors;
- Determine the impact of social conditions and work on the development and structure of the human body;

**1.3.** The discipline “Human anatomy” contributes following **competence and learning outcomes** (the relationship with the normative content of higher education graduates training, formulated in terms of learning outcomes of Higher Education Standard).

In accordance with the requirements of Higher Education Standard, discipline ensures students' acquisition of **competences**:

– *integral*:

The ability to solve complex problems, including those of a research and innovation nature in the field of medicine.

Ability to continue learning with a high degree of autonomy.

– *general*:

GC 1. Ability for abstract thinking, analysis and synthesis.

GC 2. Ability to learn and master modern knowledge.

GC 3. The ability to apply knowledge in practical situations.

GC 4. Knowledge and understanding of the subject area and understanding of the professional activities.

GC 5. Ability to adapt and act in a new situation.

GC 6. Ability to make informed decisions.

GC 7. Ability to work in a team.

GC 8. Ability to interpersonal interaction

GC 9. Ability to communicate in a foreign language.

GC 10. Skills in using information and communication technologies.

GC 11. Ability to search, process and analyze information from various sources.

GC 12. Definiteness and perseverance to the tasks and assumed responsibilities.

GC 13. Awareness of equal opportunities and gender issues.

GC 14. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine

GC 15. The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technologies, to use various types and forms of motor activity for active recreation and leading a healthy lifestyle

- *special (professional)*:

PC 1. Ability to collect medical information about the patient and analyze clinical data.

PC 2. Ability to determine the required list of laboratory and instrumental studies and evaluate their results.

PC 10. Ability to perform medical procedures.

PC 17. Ability to assess the impact of the environment, socio-economic and biological determinants on the health of the individual, family and population.

PC 21. Clearly and unambiguously communicate one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying.

PC 23. Ability to develop and implement scientific and applied projects in the field of health care.

PC 24. Adherence to ethical principles when working with patients and laboratory animals.

PC 25. Adherence to ethical principles when working with patients and laboratory animals.

Details of the competencies are set out below in the competency matrix table.

#### **COMPETENCY MATRIX**

No	Competence	Knowledge	Ability	Communication	Autonomy and responsibility
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### Integral competence

The ability to solve complex problems, including those of a research and innovation nature in the field of medicine. Ability to continue studies with a high degree of autonomy.

#### General competences

GC 1	Ability for abstract thinking, analysis and synthesis	To know: methods of analysis, synthesis and further modern training.	Be able to: analyze information, make informed decisions, acquire modern knowledge.	Establish appropriate relationships to achieve goals.	To take responsibility for the timely acquisition of modern knowledge.
GC 2	Ability to learn and master modern knowledge	To know different methods of learning to obtain modern knowledge in the field of professional activities	Be able to analyze professional information, make informed and professional decisions, acquire modern knowledge	Establish appropriate connections to achieve goals	To be responsible for learning from to a high degree autonomy and timely acquisition of modern knowledge
GC 3	Ability to apply knowledge in practical situations.	To know: specialized conceptual knowledge.	Be able to: solve complex problems and issues that arise in professional activities.	Clear and unambiguous communication of one's own conclusions, knowledge and explanations that substantiate them to specialists and non-specialists.	To take responsibility for making decisions in difficult conditions.
GC 4	Knowledge and understanding of the subject area and understanding of the professional activities.	To know: the structure of professional activity.	Be able to: carry out professional activity that needs updating and integration of knowledge.	Ability to effectively form a communication strategy in professional activities.	To take responsibility for professional development, ability to further professional training with a high level of autonomy.
GC 5	Ability to adapt and act in a new situation.	To know: elements of industrial and social adaptation and factors of successful adaptation to a new environment.	Be able to: to form an effective strategy of personal adaptation to new conditions.	Interact with a wide range of people (colleagues, management, specialists from other fields) when new situations with elements of unpredictability arise.	To take responsibility for making decisions.
GC 6	The ability to make informed decisions; to work in a team; interpersonal skills.	To know: tactics and strategies of communication, laws and methods of communicative behavior.	Be able to: make informed decisions, choose methods and strategies of communication to ensure effective teamwork.	Use communication strategies and skills of interpersonal interaction.	To take responsibility for the choice and tactics of the method of communication.
GC 7	Ability to teamwork	Know the methods of team work and methods of collective cooperation	Be able to choose ways and strategies of communication to ensure effective teamwork	Use information and communication technologies in teamwork	To be responsible for the quality of teamwork

GC 8	Ability to interpersonal interaction	Know the methods of interpersonal interaction	Be able to interact effectively with others	Establish interpersonal relationships	To be responsible for the quality of interpersonal interaction
GC 9	Ability to communicate in a foreign language.	To know: one (several) foreign languages.	Be able to: apply knowledge of a foreign language.	Use a foreign language in professional activities.	To take responsibility for using a foreign language in professional activities.
GC 10	Skills in using information and communication technologies.	To know: information and communication technologies used in professional activities.	Be able to: use information and communication technologies in the professional field that needs updating and integration of knowledge.	Use information and communication technologies in professional activity.	To take responsibility for the development of professional knowledge and skills.
GC 11	Ability to search, process and analyze information from various sources.	To know: ways of searching, processing and analyzing information.	Be able to: search, process and analyze information.	Use different methods of information processing.	To take responsibility for information management.
GC 12	Definiteness and perseverance to the tasks and assumed responsibilities.	To know: responsibilities and ways of performing tasks.	Be able to: to determine the goal and task, be persistent and conscientious in the performance of duties.	Set interpersonal communication for effective implementation of tasks and responsibilities.	To take responsibility for qualitative performance of tasks.
GC 13	Awareness of equal opportunities and gender issues	To know gender issues and equality of rights and opportunities to realize their rights	The ability to adequately assess situations of gender inequality	Be able to identify a gender problem and effectively to communicate according to the principle of equal rights	Be responsible for gender-competent behavior in the process of professional activity
GC 14	The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine	To know the ways of solving tasks and assumed responsibilities	The ability to persevere in solving tasks and faithfully fulfill assumed duties	Communicate with taking into account moral, cultural and scientific aspects	To be responsible for the preservation of moral, cultural, scientific values and achievements in professional activity and compliance with the principles of a healthy lifestyle
GC 15	The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society,	Know moral, cultural, scientific values and achievements, patterns of development of the subject area, types of recreation and principles of a healthy lifestyle	The ability to use various types and forms of motor activity for active recreation and leading a healthy lifestyle and the ability to preserve moral, cultural, scientific values and achievements	Communicate with taking into account moral, cultural and scientific aspects	To be responsible for the preservation of moral, cultural, scientific values and achievements in professional activity and compliance with the principles of a healthy lifestyle

	technology and technologies, to use various types and forms of motor activity for active recreation and leading a healthy lifestyle				
<b>Special (professional) competences</b>					
PC 1	Ability to collect medical information about the patient and analyze clinical data	Have specialized knowledge about the structure of the human body, its organs and systems; to know the mechanisms of functioning of human body systems	Be able to collect medical information, describe and explain the structure and functions of human body systems	To be aware of the importance of collecting medical information about the patient and its importance for the analysis of clinical data	To be responsible for high-quality collection of medical information and analysis of clinical data at a modern level, to draw conclusions about the state of health
PC 2	Ability to determine the required list of laboratory and instrumental studies and evaluate their results.	To know: the influence of physical factors on the human body, standard methods of laboratory and instrumental research.	Be able to: analyze research results.	Reasonably select and evaluate research results.	To take responsibility for making a decision regarding the evaluation of research results.
PC 10	Ability to perform medical procedures.	To know: biophysics of human organs and systems.	Be able to: analyze the biophysical parameters of human organs and systems.	Reasonably form and prove conclusions about the need for medical manipulations to the patient and specialists.	Responsibility, independence.
PC 17	Ability to assess the impact of the environment, socio-economic and biological determinants on the health of the individual, family and population.	To know: environmental factors that negatively affect the health of the population.	Be able to: assess the state of the environment and negative factors affecting health.	Make conclusions about the health of the population on the basis of the relationship with environmental factors.	To take responsibility for the correct conclusions regarding the negative impact of environmental factors.
PC 21	Clearly and unambiguously communicate one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying	Have in-depth knowledge of professional activity and health care issues	The ability to solve problems in new or unfamiliar environments for presence of incomplete or limited information from taking into account the aspects social and ethical responsibility	Communicate with specialists and non-specialists regarding health care issues	To communicate with specialists and non-specialists regarding health care issues
PC 23	Ability to develop and implement scientific and applied projects in the field of health care	Have in-depth knowledge of professional activity and health care issues	Ability to integrate knowledge and solve complex tasks in broad or multidisciplinary contexts	Communicate with specialists regarding health care issues	Be responsible for the reliability of the obtained scientific results

PC 24	Adherence to ethical principles when working with patients and laboratory animals	Know ethical principles when working with patients and laboratory animals	Ability to integrate knowledge and solve difficult tasks with compliance with ethical principles.	Adhere to ethical principles during professional activity.	Be responsible for compliance with ethical principles when working with patients and laboratory animals
PC 25	Adherence to professional and academic integrity, to be responsible for the reliability of the obtained scientific results.	Know the principles of professional and academic integrity	Ability to integrate knowledge and solve complex tasks in broad or multidisciplinary in contexts with observance of professional and academic integrity	Form a communication strategy in professional activities based on the principles of professional and academic integrity	Bear responsibility for the reliability of the obtained scientific results

**Learning outcomes:**

Integrative final program learning outcomes (PLO) of the discipline “Human anatomy” are:

Program learning outcomes code	Learning outcomes	Competence code
PLO - 1	Have thorough knowledge of the structure of professional activity. To be able to carry out professional activities that require updating and integration of knowledge. To take responsibility for professional development, the ability for further professional training with a high level of autonomy	GC-1, GC-2, GC-3, GC-4, GC-5, GC-6, GC-7, GC-8, GC-9, GC-10, GC-11, GC-12, GC-13, GC-14, GC-15 PC-1, PC-2, PC-10, PC-17, PC-21, PC-23, PC-24, PC-25
PLO - 2	Understanding and knowledge of fundamental and clinical biomedical sciences at a level sufficient for solving professional tasks in the field of health care	GC-4, GC-6, GC-10, GC-11, GC-12 PC-1, PC-2, PC-10, PC-17, PC-24
PLO - 3	Specialized conceptual knowledge, which includes scientific achievements in the field of health care and is the basis for research, critical understanding of problems in the field of medicine and related interdisciplinary problems	GC-1, GC-2, GC-3, GC-6, GC-7, GC-9, GC-10, GC-11, GC-12 PC-1, PC-2, PC-21, PC-23, PC-24, PC-25
PLO - 21	Search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information.	GC-2, GC-9, GC-10
PLO - 22	Apply modern digital technologies, specialized software, and statistical data analysis methods to solve complex healthcare problems.	GC-5, PC-17
PLO - 23	Assess the impact of the environment on the state of human health in order to estimate the morbidity pattern of the population	PC-17
PLO – 24	Organize the necessary level of individual safety (own and persons cared for) in case of typical dangerous situations in the individual field of activity	GC-6, PC-21
PLO - 25	It is clear and unambiguous to convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists.	GC-5, GC-6, PC-17, PC-21
PLO - 26	Manage work processes in the field of health care, which are complex, unpredictable and require new strategic approaches, organize the work and professional development of personnel taking into account the acquired skills of effective teamwork, leadership positions, appropriate quality, accessibility and justice, ensuring the provision of integrated medical help	GC-2, GC-8
PLO - 27	Communicate freely in the national and English languages, both orally and in writing to discuss professional activities, research and projects.	GC-5, GC-6, GC-7, GC-8, PC-21

**2. Content of information of General Anatomy**

There are 15,5 ECTS credit - 465 hours for the learning of Human Anatomy course

**Thematic Module 1: Introduction to Human Anatomy. Anatomy of bones**

**Specific objectives:**

- Determine subject and task of anatomy, basic anatomical study methods;
- Evaluate the main directions of modern anatomy development;
- Analyze stages of human anatomy as a fundamental discipline;
- Analyze contribution of outstanding anatomists from different epochs in the development of human anatomy;
- Analyze the contribution of prominent scientists and anatomists of Ukraine and Kyiv in the development of Ukrainian school of anatomists and in particular Kyiv anatomical school;
- Identify the main stages of embryogenesis. Analyze the derivatives of each germ layers.

**Topic 1. Subject and task of anatomy. Research methods in anatomy. The main directions of modern anatomy development. Development of Ukrainian anatomical schools. Development of Lviv anatomical schools. International Anatomical Nomenclature. Axes and planes. Bone as an organ. Classification of the bones. Development of the bones. Anatomy of the trunk bones (axial skeleton).**

Human Anatomy is the science about form and structure, origin and development of the human body, its organs and systems. Anatomy provides a systematic description of the shape, structure, condition and topographical relationship of body parts and organs taking into account their age, sex and individual characteristics.

The main directions of modern anatomy development - developmental anatomy, comparative anatomy, plastic anatomy, anthropology, environmental anatomy, etc.

Basic research methods in anatomy - visual study, anthropometric research, preparation, macro-microscopic studies, microscopic studies. Modern methods of research in anatomy: radiography-anatomical methods, computer tomography, magnetic resonance imaging (MRI), ultrasound study, endoscopy, etc..

*Basic stages of anatomy development in ancient times, during the Renaissance, in XVII-XIX centuries.* Analysis of anatomy in ancient times, during the Renaissance, in XVII-XIX centuries. The value of the works of Hippocrates, Aristotle, Galen, Avicenna, Andrew Vesalius, Leonardo da Vinci, V. Harvey, M. Malpighi, M.I. Pyrohov.

*Development of Ukrainian anatomical schools*

*Kyiv anatomical school.* Formation and development of Kyiv anatomical school. Contribution of M.I. Kozlov, O.P. Valter, V.O. Bets, M.A. Tykhomyrov, F.A. Stefanis, M.S. Spirov, I.I. Bobryk in development of Kyiv anatomical school.

Formation and development of Ukrainian Lviv anatomical school. Contribution of A. Marger, P. Krausnecker, I. Berres, H. Kadii, I-A. Markovskii, A. Liubomudrov, V. Vilhovi, Lev Lychkovski, Mykhaylo Netliukh.

International Anatomical Nomenclature. Anatomical position. Axes and planes of human body.

Anatomy of bones

*Specific objectives:*

- Use anatomical terminology for bones, their topography;
- Apply anatomical planes and axes to explain the topography of bones and their parts;
- Identify and analyze the concept of "bone as an organ";
- Analyze the mechanisms of bone development in embryogenesis;
- Use bone classification to analyze the structure of the skeleton bones;
- Describe and demonstrate the structure of the bones of the body, skull and extremities.

*Bone as an organ. Classification of bones.*

*Bone development in embryogenesis*

General information about the skeleton. The development of bone (in the phylogeny and ontogeny). Primary and secondary bones. Classification of bones. Bone as an organ. Compact and spongy bone material, its structure. Chemical composition, physical and mechanical properties of bone. The structure of a tubular bone: its parts. Features of the structure of bone in childhood, young, mature, elderly and senile age. X-ray image of bone. Impact of sports and work on the bones structure. Impact of social and environmental factors on the development and structure of the skeleton bones.

*Anatomical nomenclature. Axes and planes of the body*

The concept of international anatomical nomenclature. Its importance for the study of anatomy and unification of the study of natural and clinical sciences. Basic anatomical terms that reveal the topography of anatomical objects and their main characteristics.

Anatomical planes (sagittal, frontal, horizontal) and axis (front, vertical, sagittal), their features for the description of bones and their parts.

*Anatomy of the trunk bones*

The bones of the skeleton: vertebrae, ribs, sternum. Segmental principle in the structure of the axial skeleton.

Summary data on phylo- and ontogenesis of the vertebral column. General characteristics of the spinal column. General plan of the vertebrae. Peculiarities of the cervical, thoracic, lumbar vertebrae, sacrum, coccyx bones. Age

and gender characteristics of the vertebral structure. The impact of social and environmental factors on the structure of the vertebrae. Malformations of the vertebrae.

The development of the ribs and sternum in phylo- and ontogenesis. Classification of ribs. The structure of the ribs and sternum. Forms of ribs and sternum variability, variants and abnormalities. Age and gender characteristics of sternum structure. The impact of social and environmental factors on the structure of the ribs and sternum.

**Topic 2. Anatomy of the skull (neurocranium): frontal, occipital, parietal, and ethmoidal bones.**

Skull development in phylo- and ontogenesis. Brain and facial skull sections. The structure of the bones that form the cerebral cranium: frontal, occipital, parietal, sphenoid, temporal, lattice.

**Topic 3. Anatomy of the skull (neurocranium): sphenoid and temporal bones. Canals of temporal and sphenoid bones.**

**Topic 4. Anatomy of the skull: bones of viscerocranium. Facial norma of skull: orbit and nasal cavity.**

The structure of the bones that form the facial skull: mandible, maxilla, zygomatic, nasal, palatine, lacrimal, hyoid bone, vomer, inferior turbinate. Structure of the walls of orbit. Bony nasal cavity and its walls. Bony nasal septum.

**Topic 5. The skull in total. The base of the skull. Temporal, infratemporal, pterygopalatine fossae.**

The vault of the skull, external and internal base of the skull. Anterior, middle and posterior cranial fossa, orbit, bone nasal cavity, temporal, infratemporal, pterygopalatine fossae. Age and sex features of the skull structure. Variations and abnormalities of the skull bones. X-ray anatomy of the skull.

**Topic 6. Anatomy of the bones of the upper extremity.**

Upper limb: its divisions. The bones of the upper limb: departments. Upper extremity: clavicle, scapula; their structure. The free part of the upper limb: humerus, forearm and hand, sesamoid bones; their structure. Ossification of the bones of the upper limb. Development of bones of the upper limb in ontogeny. Variations and abnormalities of the bones of the upper limb.

**Topic 7. Anatomy of the bones of the lower extremity.**

Lower limb: its divisions. The bones of the lower extremity: departments. The belt of the lower extremity: hip bone; structure. Parts of the hip bones, their structure. Free part of the lower limb: femur, tibia, feet bone; their structure. Ossification of the bones of the lower limbs. Development of bones of the lower limb in ontogeny. Variations and abnormalities of the bones of the lower limbs.

Homology of the upper and lower extremities bones. Age, sex features of the extremities bones structure. Specific structural features of the bones of the upper and lower extremities influenced by the anthropogenesis. The impact of sport, work, social factors and environmental factors on the structure of bones of the upper and lower extremities.

**Topic 8. Practical skills of the anatomy of the bones. Thematic modul 1 "Introduction to anatomy. Anatomy of bones".**

**Thematic module 2. Connection of bones (Articulations).**

**Topic 9. Anatomy of movable and immovable joints. The development of articulations in ontogenesis. Articulations between the bones of trunk and head.**

The development of articulations between in phylo- and ontogenesis. Classification of joints between bones. Types of synarthroses: fibrous joints (syndesmosis) - membranes, ligaments, sutures, fontanelles; cartilaginous connection (synchrondrosis) - permanent, temporary, hyaline, fibrous symphysis. Diarthrosis (synovial connections, joints): definition, basic features of the joint, their characteristics. Additional components of the joints. Classification of joints by the structure, form of articular surface, function. Simple, complex, and compound joints: their characteristics. Types of movements and their analysis (movement axis, movement plane). Uniaxial, double-axial and multi-axis joints, their types, characteristics of movements in each type of joint.

Connection between the trunk bones and the skull bones

Classification of joints of the spine. Syndesmoses of the spine: their characteristics and structure. Synchrondroses of the spine: their characteristics and structure. The joints of the vertebral column: median atlanto-axial joint, lateral atlanto-axial joint, articulationes zygapophysiales, lumbosacral joint, sacrococcygeal joint: their structure. Vertebral column as a whole. Age, gender peculiarities of the spine as a whole. The impact of sport, work, social factors and environmental factors on the spine as a whole.

Chest joints: syndesmosis, synchrondrosis and joints (costal-vertebral joints, costal-transverse joints, sternum-rib joints): their characteristics and structure. Thorax as a whole, its structure. The impact of sport, work, social factors and environmental factors on the structure of the chest as a whole.

Skull joints: classification. Skull syndesmosis: sutures, their types and characteristics. Skull synchrondrosis : types, characteristics, age features. The joints of the skull: the temporo-mandibular joint and the atlanto-occipital joint: their structure. Age features of the skull joints: fontanel, their types, structure, ossification periods.

**Topic 10. Articulations of the upper extremity.**

Connection of the upper extremity. Pectoral girdle joints: syndesmoses of the upper extremity girdle and joints and upper extremity girdle (shoulder -clavicular joint and sternum-clavicular joint), their structure. Connection of the free upper extremity: shoulder joint, elbow joint, forearm joints, wrist joint, joints of the hand.

**Topic 11. Articulations of the lower extremity. Practical skills and summary of the bones and their joints anatomy. Thematic module 2. Connection of bones (Articulations).**

Connection of the lower extremity. Pelvic girdle joints: syndesmoses, pubic symphysis, sacroiliac joint. Pelvis as a whole: its structure, pelvis dimensions. Age, gender, individual characteristics of the pelvis. Connection of the free lower limb: hip joint, knee joint, tibio-fibular joint, ankle joint, joints of the foot. Arches of the foot. X-ray anatomy of bone joints of the upper and lower extremities. The impact of sport, work, social factors and environmental factors on the structure of joints of the upper and lower extremities.

**Thematic module 3. Anatomy of muscles.**

**Topic 12. General myology. Muscle as an organ. Classification of muscles. Development of skeletal muscles. Muscles of the back.**

Muscle as an organ - definition. Tendon, aponeurosis. Auxiliary systems of the muscle: fascia, synovial sheath, synovial bags, sesamoidbone, tendon arc, muscular block. Anatomical and physiological muscles breadth: basic data on strength and muscle performance; concept of leverage. The beginning and the attachment of muscles: their functional characteristics.

Classification of muscles: by development, topography, shape, size, direction of muscle fibers, function, etc. Development of muscles in phylo- and ontogenesis. Development source of the trunk, head, neck, upper and lower extremities muscles.

Segmental structure of the muscles of the trunk. Back muscles: superficial and deep muscles, their characteristics. Thoraco-lumbar fascia.

**Topic 13. Anatomy of the muscles and fascia of the thorax.**

Classification of muscles of the trunk by topography, development and form. The muscles of the chest: superficial and deep muscles, their characteristics. Thoracic fascia, intrathoracic fascia.

**Topic 14. Anatomy of the muscles and fascia of the abdomen.**

Abdominal muscles: muscles of the anterior, lateral and posterior walls of the stomach, their characteristics. Abdomen fascia. White line. Umbilical ring. Topography of the abdomen areas. Inguinal canal. Abdominal pressure. Sheath of rectus abdominis muscle. Diaphragm - definition. Parts of diaphragm, apertures, their contents, and triangles.

**Topic 15. Anatomy of the muscles and fascia of the head**

Head muscles: classification. Muscles of mastication and expression and their characteristics. Head fascia.

**Topic 16. Anatomy of the muscles and fascia of the neck. Neck topography**

Muscles of the neck: classification. Superficial, medium and deep neck muscles and their characteristics. Neck fascia: anatomic classification and anatomical and topographical classification. Neck topography: areas, triangles and spaces.

**Topic 17. Anatomy of muscles of the upper extremity.**

Muscles of the upper limb: classification. Upper extremity muscles and their characteristics. The muscles of the shoulder: classification, their characteristics. Forearm muscles: classification, their characteristics. Hand muscles: classification and their characteristics.

**Topic 18. Fascia and topography of the upper extremity.**

Axillary fossa, axillary cavity, its topography, triangles, quadrilateral and trilateral holes. Brachiocephalic muscular canal. Sulcus on the front of the shoulder. Ulnar fossa. Sulcus on the anterior surface of the forearm. Bone-fibrous tunnel, flexor retinaculum, extensor retinaculum. Carpal tunnel, synovial sheath tendon flexor muscles. Synovial bags.

**Topic 19. Muscles of the lower extremity.**

Muscles of the lower limb: classification. Muscle of the lower limb girdle: classification and their characteristics. Muscles of the hip: classification and their characteristics. Leg muscles: classification and their characteristics. The muscles of the foot: classification and their characteristics.

**Topic 20. Topography and fascia of the lower extremity. Practical skills and summary of myology material. Thematic module 3 "Anatomy of muscles".**

Fascia of the lower limb. Muscular and vascular lacuna, their topography and content. Femoral triangle. Sulcus on the front of the thigh. Adductor channel. Popliteal fossa. Tibial canals: cruro-popliteal channel, upper and lower musculo-peroneal channels. Sulcus of sole of the foot. Saphenous opening. Flexor retinaculum, extensor retinaculum, peroneal muscles retinaculum. Synovial bursae and synovial sheath of the muscles of the lower limbs. Mechanisms that support the arches of the foot: tightening the foot, passive (links) and active (muscle).

Analysis of key positions and movements of the human body (standing, walking, running, jumping). Distinctive features of the structure of the human skeletal system acquired in connection with bipedal locomotion. Age, sex and individual features of skeletal muscles. The impact of sport, work, social factors and environmental factors on the structure of skeletal muscles of the trunk and extremities.

**Thematic module 4. Digestive system**

**Topic 21. Introduction to splanchnology. Classification of internal organs. General patterns of the tubular organs. General patterns and structure of parenchymatous organs. Human anatomy of digestive system. Anatomy of the oral cavity and its derivatives.**

Digestive system: organs, function. Development of the oral cavity and its derivatives. Development of the gastrointestinal tract. Development of the liver and pancreas. Primary and secondary body cavity. Sources of serous membranes development. Development of the peritoneum. Structural mechanisms of defects of the oral cavity and its derivatives. Abnormalities and variants of development of the gastrointestinal tract, liver and pancreas.

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

Oral cavity: its components. The walls of the vestibule of the mouth and oral cavity, their connection. Palate: hard palate, soft palate, their structure. Tonsils. Tongue: part. Features of the structure of the mucous membrane, tongue muscles. Glands of oral cavity: classification, their development. Lesser salivary glands: classification, topography, structure. Greater salivary glands: topography, characteristics, structure.

**Topic 22. Anatomy of teeth.**

Teeth. Parts of the tooth. Surface of the crown. General structure of the teeth. Periodontal membrane, periodontium. Gums. Permanent teeth: their formula, description of each type of teeth. Terms of eruption of permanent teeth. Deciduous teeth: formula, structural features, eruption terms. X-ray anatomy of the teeth. Bite. Development of teeth. Abnormalities and variants of teeth.

**Topic 23. Anatomy of the throat, esophagus. Anatomy of stomach. Regions of anterior abdominal wall.**

Throat and its topography, parts, connections. Fauces its limits. Lymphatic (lymphoid) ring of the pharynx. The structure of the pharyngeal wall: mucosa, pharyngeal-main fascia, muscles of the pharynx, the outer shell.

Esophagus: topography, parts, wall structure. Narrowing of the esophagus. X-ray anatomy of the esophagus.

Stomach: topography, part of the stomach. The structure of the stomach wall: structural features of the mucosa (relief, glands), muscular layer and serosa. X-ray and gastroscopy characteristics of the mucosa. Stomach and peritoneum. Stomach connections. Variations of the stomach form: anatomical (on a corpse) and radiographic (on a living person). The shape of the stomach, depending on the type of body structure. Age features of the topography and structure of the stomach.

**Topic 24. Anatomy of small and large intestine**

Small intestine, its departments. Duodenum: parts, topography, variations of form and position. X-ray anatomy duodenum. Topography of the mesenteric small intestine: empty and ileum one. The structure of the wall of the small intestine. The structure of the mucosa: intestinal villi, glands, folds, lymphatic (lymphoid) nodules. Features of the structure of the mucous membrane of the small intestine in its various departments. The structure of the muscle layer. Peritoneum and each part of small intestine. Age-related structural features of the small intestine. Colon: departments. The structure of the wall of the large intestine: mucosa (glands, folds, lymphatic (lymphoid) nodules), muscle membrane, serous membrane. Peritoneum and each part of the colon. The cecum and appendix: topography, structural features. Variants of the position of the appendix and its projection on the anterior abdominal wall. Colon: parts, bends, their topography, structural features of the mucosa and muscle layer. Position in respect of peritoneum. Rectum: parts, folds, topography. Features of the rectum topography depending on sex. Features of the structure of the mucosa and muscle layer. Position in respect of peritoneum. Anal canal: topography, structural features of the mucosa and muscle membranes. Sphincter. Macroscopic features of the structure small and large intestine. Age structural features of the colon. X-ray anatomy of the colon. The shape and position of the colon in a living person.

**Topic 25. Anatomy of the large digestive glands: liver and pancreas.**

Liver. Topography. External structure: edges, surfaces and their relief. Connections of the liver. Position in respect of peritoneum. The internal structure of the liver: lobes, segments, small segments. The vessels of the liver. Liver function. Bile secretion. Gallbladder: topography, parts, wall structure, function. The common bile duct: formation, topography. Age features of the topography and structure of the liver. Age-related structural features of the gall bladder.

Pancreas: parts, topography, structure, functions. Pancreatic ducts. Islets of Langerhans. Age features of the topography and structure of pancreas

**Topic 26. Anatomy of the peritoneum.**

Peritoneum. Abdominal cavity and its contents. Peritoneum cavity and its contents. Parietal peritoneum, internal peritoneum: their characteristics. Options of the position of internal organs in respect of the peritoneum. Derivatives of the peritoneum: omentum, mesentery, ties, their structure and function. Derivatives of the peritoneum cavity: bursas (hepatic, pregastric, omental - their walls, connections), sinuses, channels, recesses, holes,

impressions. Topography of the peritoneum in the pelvic cavity: characteristics by sex. Topography of parietal peritoneum on the walls of the abdominal cavity.

**Topic 27. Practical skills and summary of the material on anatomy of the digestive system. Thematic module 4 "Digestive system".**

**Thematic module 5. Anatomy of the respiratory system. Mediastinum.**

**Topic 28. General anatomy of the respiratory system. Embryogenesis of the respiratory system. Anatomy of the respiratory system .**

Respiratory system: organs, function. The upper and lower airways. Development of the respiratory system in phylo- and ontogenesis. Variations and abnormalities of the respiratory system.

External nose: parts, structure. Nasal cavity: vestibule, nasal passages, paranasal sinuses. The functional parts of the nasal cavity. The nasal part of the pharynx. Age features of the nasal cavity.

Larynx. Topography. The structure of the larynx: cartilage, ligaments, joints and muscles. Elastic cone, quadrangular membrane. The cavity of the larynx: parts, their limits. Vocal folds, vestibular folds. Glottis. Mechanisms of phonation. X-ray anatomy of larynx, laryngoscopy. Age features of the larynx.

**Topic 29. Anatomy of trachea, main bronchi, lungs. Pleura. Mediastinum. Practical skills and summary of the material on anatomy of the respiratory system.**

Trachea: parts, topography, wall structure. The main bronchi: topography, wall structure. Bronchial tree. Age features of the trachea and main bronchi.

Lungs: topography, external structure. Hilum of the lungs. Root of the lung and its components. Lobes, segments, small segments of the lung. Acinus. The circulatory system of the lungs. X-ray anatomy of the trachea, bronchus and lung. Age features of the lungs.

Pleura. Parietal pleura and its topographic parts. Inside pleura. Pleural cavity: content, recesses, their functions. Projection of pleural sacs on the walls of the chest cavity.

Mediastinum: definition, limits. The organs of the anterior mediastinum. Organs of posterior mediastinum.

**Thematic module 6. Anatomy of the urogenital systems, endocrine and immune systems.**

**Topic 30. General anatomy of the urinary system.**

***Embryogenesis of the urinary system. Abnormalities and variants of the of urinary system development. Structure of the urinary organs. Their functions.***

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

Kidney: topography of the right and left kidney. The outer structure of the kidney. Position of the kidney in respect of the peritoneum. Membrane of the kidney. Fixing apparatus of the kidney. Topography of the elements of the renal pedicles. The internal structure of the kidney. Segments of the kidney. Nephron - structural and functional unit of the kidney. The structure of the circulatory system of the kidney. Urinary tract. Small renal calyx, major renal calyx, renal pelvis, wall structure, function. X-ray anatomy of the kidney. Age features and structure of the kidneys.

Ureter: parts, topography, structure of wall, function. Position in respect of peritoneum. Narrowing of the ureter.

Bladder: form, external structure, parts. Features of topography in men and women. The structure of the wall of the bladder: structural features of the mucosa, muscle layer. Position in respect of peritoneum (depending on the functional state).

Female urethra. Male urethra. X-ray anatomy of the urinary tract (ureters, bladder, urethra). Age features of the bladder.

**Topic 31. General anatomy of the male reproductive system. Anatomy of the male genital organs.**

***Perineum***

Male reproductive system: organs, function. Classification of the male reproductive system. Internal male genitalia. External male genitalia. The development of the male reproductive system in phylo- and ontogenesis. Variations and abnormalities of the internal male genital organs: testicles, epididymidis, vas deferens, seminal vesicles, prostate gland. Variations and abnormalities of the external male genitalia. Hermaphroditism.

The internal male genitalia. Testis: topography, structure. Epididymidis. The process of the descendens testis. Membrane of testis. Ejaculatory ducts: parts, their topography, wall structure. Spermatic cord and its components. Seminal vesicles: topography, structure, functions. Ejaculatory duct. Prostate: topography, parts, structure, functions. Bulbourethral gland. Age features of internal male genitalia.

External male genitalia. Scrotum. The penis, its structure. Male urethra: parts, their topography, wall structure.

**Topic 32. General anatomy of the female reproductive system. Anatomy of the female genital organs.**

***Mammary gland***

Female reproductive system: organs, function. Classification of the female reproductive system. Internal female genitalia. External female genitalia. The development of the female reproductive system in phylo- and ontogenesis. Variations and abnormalities of the internal female reproductive organs: ovaries, fallopian tubes, uterus, vagina. Variations and abnormalities of the external female genitalia development:

Internal female genitalia. Ovary: topography, external structure, internal structure, ovary connections, position in respect of peritoneum, function. Cyclic changes in the structure of the ovary. Age-related structural features of the ovary. Fallopian tube: topography, parts, walls structure, position in respect of peritoneum, function. Uterus: topography, shape, parts, wall structure. Connections of the uterus, position in respect of peritoneum, function. Age-related structural features of uterine and options for its position. Vagina: vault, wall structure. X-ray anatomy of internal female genitalia.

External female genitalia. Female pudendum: mons pubis, large pudendal lips, small pudendal lips, vulvar vestibule, vestibular bulb, large vestibular glands, small vestibular glands. Clitoris. Female urethra. Perineum: definition, topography. Urogenital diaphragm: boundaries, muscles, fascia, sex differences. Pelvic diaphragm: limits, muscle, fascia. Ischioanal fossa: limit, content.

### **Topic 33. General anatomy of the central and peripheral organs of the immune system**

Immune system: functions. Classification of immune (lymphatic or lymphoid) system by function. The central organs of the immune system (primary lymphoid or lymph organs): bone marrow, thymus - structural patterns of their functions. Peripheral organs of the immune system (secondary lymph or lymphoid organs): structural patterns of their functions.

The development of the immune system in embryogenesis. Central immune system (primary lymphoid or lymph organs). Red bone marrow. Yellow bone marrow. Topography, structure, functions. Age features of the bone marrow. Thymus: topography, structure, functions. Age features of the thymus. Peripheral organs of the immune system (secondary lymph or lymphoid organs). Spleen: topography, structure, functions. Lymphatic (lymphoid) ring of the throat: tonsils that form it, their topography, structure, functions. Lymph nodes: classification, structure, function. Solitary lymphatic (lymphoid) nodules: topography, structure, functions. Clusters of lymphatic (lymphoid) nodules: topography, structure, functions. Clusters of lymphatic (lymphoid) nodules of the appendix: topography, structure, functions. Age-related structural features of the peripheral immune system.

### **Topic 34. General anatomy of endocrine system**

General principles of the structure of endocrine organs. Structural definition of "endocrine function". Structural mechanisms of hormone activity. Classification of endocrine organs. Development of endocrine organs in embryogenesis. Features of functional activity of endocrine organs during the prenatal period of human ontogenesis. Variations and malformations of endocrine organs.

Thyroid gland: topography, structure, functions. Parathyroid gland: topography, structure, functions. Adrenal gland: structure, 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 35. Practical skills and summary of the anatomy of splanchnology. Thematic module 6 "Anatomy of urogenital system, immune and endocrine systems"**

### **Thematic module 7. Anatomy of the central nervous system**

**Topic 36. Introduction to the CNS. General principles of reflex arcs structure. Gray and white matter of the CNS. Development of the central nervous system in ontogenesis and phylogenesis. External and internal structure of the spinal cord.**

The leading role of the nervous system in the body; its importance for the integration of organs, organ systems into a single body, in establishing relations with the environment. Classification of the nervous system based on topographic principle (into central nervous system and peripheral nervous system) and anatomical and functional principle (somatic nervous system and autonomic nervous system). The general principle of the structure of the neuron. Morphological and functional classification of neurons. Receptors and their classification. General plan of synapses. Reflex arc. Gray matter of the CNS. Neuroglia. Principles of spatial organization of the gray matter of the CNS. Ganglia. White matter of the CNS. The nerve fibers, nerve bundles, roots.

Stages of the nervous system development in phylogeny. Development of the nervous system in ontogenesis. Development of the spinal cord in embryogenesis. Brain development in embryogenesis: stage of three and five brain bubbles and their derivatives. Abnormalities of the spinal cord. Abnormalities of the brain.

Topography of the spinal cord and its limits. The outer structure of the spinal cord (surface, sulcus, cords, thickening). Segmental structure of the spinal cord. The relationship between the vertebrae and spinal cord segments (Chapault rule). The internal structure of the spinal cord: central canal, gray and white matter. The structure of the posterior, lateral and anterior horns of the spinal cord. White matter: classification. Composition of the front, side and rear funiculus of the spinal cord. Own segmental apparatus of the spinal cord. The sensor node spinal nerve. Anterior and posterior roots. Formation of spinal nerve trunk. Age-related structural features of the spinal cord.

### **Topic 37. Embryogenesis of the brain. Anatomy of the medulla oblongata and pons.**

The brain. Parts of the brain: the great brain, cerebellum, brain stem. Classification of the brain departments by development. Derivatives of the rhomboid brain: medulla oblongata and hindbrain (pons and cerebellum).

Medulla oblongata: boundaries, external structure. Internal structure: gray and white matter.

Pons: external structure. Internal structure: gray and white matter.

### **Topic 38. Anatomy of cerebellum. IV ventricle. Rhomboid fossa.**

Cerebellum: topography, external structure. Internal structure: gray and white matter. Cerebral peduncle. Rhomboid fossa: formation, borders, relief. Projection of the nuclei of cranial nerves on the surface of rhomboid fossa. Fourth ventricle: wall, connection

**Topic 39. Anatomy of the midbrain.**

Midbrain and its parts. Roof plate: external structure; internal structure: gray and white matter. Brain peduncle, parts, internal structure: gray and white matter. Cerebral aqueduct. 12 pairs of cranial nerves of the brain.

**Topic 40. Anatomy of the interbrain.**

Diencephalon: parts (dorsal - thalamic brain, ventral part - the hypothalamus). Parts of the thalamic brain: the thalamus, epithalamus, metathalamus. Thalamus: external structure. Internal structure: nucleus and their functions. Epithalamus: parts. The pineal gland and its functions. Metathalamus: parts and their functions. Hypothalamus: its components. Pituitary. The nuclei of the hypothalamus, their function. Hypothalamic-pituitary system. The third ventricle: walls, connection.

**Topic 41. Cortex of telencephalon. Rhinencephalon. Lateral ventricles.**

Cerebrum: cerebral hemisphere. Olfactory brain: parts, their constituents. Lateral ventricles. Their main parts, topography, walls and communications.

**Topic 42. Telencephalon. Pallium.**

Pallium. Cortex: cytoarchitectonics and myeloarchitectonics of the cortex. Works of V.O. Betts. The relief of the cerebral hemispheres: sulcus and gyrus. Morphological basis of dynamic localization of functions in the cerebral cortex of the brain.

**Topic 43. Basal nuclei. White matter of cerebral hemisphere.**

Basal nuclei: topography, parts, functions.

White matter of the hemispheres: classification. Associative fiber: classification, functions. Commissural fibers and their functions. Corpus callosum, fornix, anterior commissure.

Projection fibers: classification. Internal capsule: parts, pathways topography in each part. Age-related structural features of the brain.

**Topic 44. Meninges of the spinal cord and brain. Formation and circulation of cerebrospinal fluid. 12 pairs of cranial nerves and their running from the brainstem.**

Meninges of the spinal cord. Intermeningeal spaces and their contents. Meninges of the brain. Peculiarities of dura mater of the brain. Processes of dura mater of the brain, their topography. Sinuses of the dura mater of the brain. Intermeningeal spaces of the brain and spinal cord and their content. Formation and circulation of cerebrospinal fluid. Lateral ventricles: parts, walls, connection, circulation of cerebrospinal fluid. 12 pairs of cranial nerves and their running from the ventral and dorsal surfaces of brainstem.

**Topic 45. Afferent pathways of CNS.**

Pathways - definition. Anatomical and functional classification of the pathways of the central nervous system: associative pathways (short and long), commissural pathways, projection pathways (ascending and descending). Ascending (afferent) pathways: exteroceptive, proprioceptive, interoceptive.

**Topic 46. Efferent pathways of CNS.**

Descending (efferent) pathways: pyramidal, extrapyramidal, corticospinal-bridge. Pyramidal motor system (centers, pathways). Extrapyramidal system (centers, pathways).

**Topic 47. Practical skills, summary of material on spinal cord and brain anatomy. Thematic module 7 "Anatomy of CNS".**

**Thematic module 8. Sensory organs**

*Specific objectives:*

- Identify the general principles of structure and function of the sensory system;
- Analyze the development of the sensory system in phylo- and ontogenesis;
- Analyze abnormalities and variants of the sensory system development;
- Describe and demonstrate the structure of the eyeball and additional structures of the eye;
- Describe and demonstrate the structure of the external ear, middle ear and inner ear.

**Topic 48. Anatomy of the sensory system. Organ of vision and its conducting pathway.**

Anatomical and functional characteristics of the sensory system. Peripheral receptors, pathways and cortical centers of the analyzers, their functional unity.

Phylo- and ontogenesis of the eye. Abnormalities and variants of the eye development. Topography, structure, functions. Eyeball. Eyeball membrane: fibrous, vascular, inner (retina) - their structure. Eyeball chambers: front, rear, their walls. Vitreous humour, lens. Aqueous humor: the place of production, drainage. Accommodative apparatus of the eye. Additional structures of the eye: eyelids, eyebrows, conjunctiva, external muscles of the eyeball, eye socket fascia. Lacrimal apparatus and its components. Pathways of the visual analyzer. Pupillary reflex pathways.

**Topic 49. Anatomy of the ear. Organ of hearing and balancing and their conducting pathways.**

Ear. Phylo- and ontogenesis. Abnormalities of the ear. Parts of the ear: external, middle and inner ear. External ear: parts and their structure. Middle ear: parts. Tympanic cavity: walls, content. Ossicles: their structure.

Joints, ligaments, muscles of auditory ossicles. Connections of the tympanic cavity. Auditory tube: part and structure. Inner ear, parts and topography. Bony labyrinth: vestibule, semicircular canals, cochlea, their structure. Membranous labyrinth: vestibular labyrinth, semicircular ducts, cochlear duct, their structure. The mechanism of sound perception and sound pathways. Pathways of hearing and balancing.

**Topic 50. Organ of taste. Organ of smell. Afferent pathways of gust and smelling. Skin and its derivatives. Pathways of skin analyzer.**

Olfactory system. Olfactory mucosa of the nose. Pathways of olfactory analyzer. Gustatory system. Taste buds of the tongue, their topography. Pathways of taste analyzer. The total cover. Skin: function. Types of skin sensitivity. Lacteal gland. Afferent pathways of skin sensation.

**Topic 51. Practical skills and summary of the sensory system anatomy Thematic module 8 “Sensory organs”.**

**Thematic module 9. Cranial nerves.**

**Topic 52. Classification of the cranial nerves. General anatomy of the autonomic ganglia of the head. I,II,III,IV,VI,VIII pairs of cranial nerves.**

General characteristics of the cranial nerves. Common features and differences in the structure of the cranial and spinal nerves. Classification of cranial nerves by function (motor, sensory, mixed). Classification of cranial nerves by origin. The development of the cranial nerves connected with the sensory system (pair I, II, VIII), myotomes of the main somites (pairs III, IV, VI, XII), gill arches (pair V, VII, IX, X, XI). Differences in the structure of the cranial nerves, brain derivatives (pair I, II) on the rest of the cranial nerves. General plan of motor, sensory and mixed cranial nerves. General structure of the autonomic ganglia of the head: roots, branches. Anatomy of cranial nerves: the nucleus, their localization, output of the nerve from the brain, from the skull, nerve branches, the composition of their fibers, topography, areas of innervation. I, II pairs of cranial nerves – features of their anatomy. IV, VI pairs: their nucleus, output of the nerve from the brain, from the skull, areas of innervation. III pair of cranial nerves: nucleus, output of the nerve from the brain, from the skull, branches, composition of fibers, areas of innervations, connection with the vegetative nodes of the head (ciliary node). Anatomy of the VIII pair: sensitive nodes, topography.

**Topic 53. V pair of cranial nerves, its 3 main branches**

V pair of cranial nerves: intracranial part – nucleus, sensory node, sensory and motor roots. Branches of the V pair: composition of fibers, output from the skull, areas of innervation, connection with the autonomic nodes of the head. Connection of the trigeminal nerve branches with autonomic nodes of the head (ciliary, pterygopalatine, submandibular, oticum).

**Topic 54. VII pair of cranial nerves. Autonomic ganglia of the head.**

VII pair and intermediate nerve: nuclei, topography, branches, composition of fibers, areas of innervation. Connection of intermediate nerve branches with autonomic nodes of the head (pterygopalatine, submandibular).

**Topic 55. IX, X, XI, XII pairs of cranial nerves.**

IX pair: nuclei, output of the nerve from the brain, from the skull, branches, composition of fibers, areas of innervation. Connection with autonomic nodes of the head (otic node). X pair: nuclei, sensitive and autonomic nodes, the output of the nerve from the brain, from the skull, branches, areas of innervations. XI pair: nucleus, output of the nerve from the brain, from the skull, areas of innervation. XII pair: nucleus, output of the nerve from the brain, from the skull, areas of innervation.

Autonomic ganglia of the head (pterygopalatine, ciliary, submandibular, otic): their roots and branches, areas of innervations.

**Topic 56. Spinal nerves. Cervical plexus. Thoracic nerves.**

General plan of somatic nerve plexus formation. Components of the peripheral nervous system: nerves, ganglia, nerve plexus, nerve endings. General plan of the nerve. Neurovascular bundles. Classification of nerves. Segmental peripheral nerves distribution. Ganglia: classification. General plan of sensitive nodes. Spinal nerve: formation, composition of fibers, branches; compliance with the segments of the spinal cord. Rear branches of spinal nerves: structure of fibers, topography, general patterns of innervation. Posterior branch of the cervical, thoracic, lumbar, sacral and coccygeal nerves. Anterior branches of spinal nerves: structure of fibers. General patterns in the formation of somatic nerve plexus. General patterns in anatomy of the anterior branches of thoracic nerves. Connection of spinal nerves with the autonomic nervous system.

Cervical plexus: sources of formation, topography, branches, areas of innervations. Thoracic nerve: branches. Intercostal nerves: topography, composition of fibers, branches, areas of innervations.

**Topic 57. Practical skills and summary of the cranial nerves anatomy and anatomy of cervical plexus. Thematic module 9 “Cranial nerves”. Final control.**

**Thematic module 10. Vessels of the head and neck.**

**Topic 58. Aorta. Branches of aortic arch. Common and external carotid arteries. Blood vessels of the head and neck.**

General principles of the structure and function of the cardiovascular system. Vascular components of the cardiovascular system: arteries, veins, vessels of the hemomicrocirculatory bed. Lymphatic vessels, the principles of their structure, functions.

Aorta, parts of the aorta. Aortic arch and its branches. Common carotid artery: topography, branches. Features of the right and left common carotid artery. External carotid artery: topography, classification of branches. The branches of the external carotid artery: topography, areas of blood supply.

**Topic 59. *The internal carotid artery and subclavian artery.***

The internal carotid artery: parts, their topography. The branches of the internal carotid artery: topography, areas of blood supply.

Subclavian artery: parts, their topography. Features of the right and left subclavian artery. The branches of the subclavian artery: topography, areas of blood supply. Blood supply of the brain and spinal cord. Arterial circle of the brain. Intersystem arterial anastomoses in the region of the head and neck.

**Topic 60. *Venous vessels of the head and neck. Lymphatic vessels and nodes of the head and neck.***

Internal jugular vein: formation, topography, classification of tributaries. Intracranial tributaries, extracranial tributary of internal jugular vein.

Pterygoid plexus: topography, formation. Anastomosis between the intracranial and extracranial internal jugular vein and its tributaries. External jugular vein: formation, topography, tributaries. Anterior jugular vein: formation, topography, tributaries. Jugular venous arch: topography, formation. Brachiocephalic vein: roots, topography, tributaries. Superior vena cava: roots, topography, tributaries.

Thoracic duct: roots, topography, tributaries, the confluence of the venous system. Right lymphatic duct: roots, topography, the confluence of the venous system.

Jugular trunks: formation, topography, areas of lymph inflow, lymph ducts confluence. Lymph nodes of the head: classification, topography, areas of lymph inflow, lymph outflow path. The lymph nodes of the neck: classification, topography, areas of lymph inflow, lymph outflow path.

**Topic 61. *Vascularization and innervation of the head and neck. Thematic module 10 "Vessels of the head and neck".***

Vascularization (arterial blood supply, venous and lymphatic outflow) and innervation of the head and neck: oral mucosa, soft palate, tongue, upper and lower teeth, pharynx, tonsils, parotid gland, submandibular gland, sublingual gland, mucous membrane of the nasal cavity, pharynx, larynx, thyroid gland, eyeball, lacrimal gland, the external muscles of the eyeball, the outer ear, middle ear, inner ear, the brain, the cerebellum, brain stem, dura mater of the brain, masticatory muscles, muscles of the face (facial) muscles, neck, skin, face muscles, temporomandibular joint.

**Thematic module 11. Anatomy of the heart. Vessels and nerves of the trunk.**

**Topic 62. *Introduction to the cardiovascular system. Anatomy of the heart (I): topography, anatomy of chambers. Systemic and pulmonary circulation. Fetal circulation. Development of the heart in embryogenesis. Abnormalities and variations of the heart development.***

Introduction to the cardiovascular system. Anatomy of the heart. Topography of the heart. The shape, position of the heart. External structure of the heart. Chambers of the heart: their structure. Heart valves. The structure of the heart wall: endocardium, myocardium and epicardium. Conducting system of the heart. Arteries and veins of the heart. Core, its structure, core cavity, content sinus. Projection of the boundaries of the heart and valves on the front wall of the chest cavity. Age-related anatomy of the heart. Systemic and pulmonary circulation. Fetal circulation.

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

**Topic 63. *Anatomy of the heart (II): structure of the cardiac wall. Blood supply of the heart and pericardium. Topography of the heart. Its projection to the chest.***

The structure of the cardiac wall: endocardium, myocardium and epicardium. Conducting system of the heart. Arteries and veins of the heart. Core, its structure, core cavity, content sinus. Projection of the boundaries of the heart and valves on the chest.

**Topic 64. *General anatomy of arteries. Thoracic aorta. Abdominal aorta (parietal and paired visceral branches).***

Anatomical classification of arteries (paracardiac, arterious trunks, extraorganic and intraorganic). Classification of arteries by wall structure. Types of arteries branching. The main patterns of arteries distribution in the human body. Arterial intersystem and intersystem anastomoses. Sources and mechanisms of arteries development. Arterial arches and their derivatives. Variations and abnormalities of the trunk arteries development. Works of M.A.Tykhomyrov. Vessels of the hemomicrocirculatory bed, structure and function of their walls. Sources and mechanisms of hemomicrocirculatory bed vessels development. Works of the Department of Anatomy of O.O. Bohomolets NMU. Organ specificity of hemomicrocirculatory bed vessels. The concept of paths of collateral (bypass) flow of blood. Age features of arteries. X-ray anatomy of the arteries.

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

The abdominal aorta: topography, classification of branches. Parietal branches of the abdominal aorta: topography, areas of blood supply. Visceral branches of the abdominal aorta: unpaired and paired ones. Paired visceral branches of the abdominal aorta: topography and areas of blood supply.

**Topic 65. Abdominal aorta (unpaired visceral branches). Arteries of the pelvic cavity.**

Unpaired visceral branches of the abdominal aorta: topography and areas of blood supply. Intrasystem arterial anastomoses between the branches of the abdominal aorta.

Common iliac artery: formation, topography, branches. Internal iliac artery: topography, classification of branches. Parietal and visceral branches of the internal iliac artery: topography, areas of blood supply, intersystem and intersystem arterial anastomoses.

**Topic 66. General anatomy of the veins. Veins of the trunk. Intrasystem and intersystem venous anastomoses. General anatomy of the lymphatic vessels.** Lymph nodes of the thoracic, abdominal and pelvic cavities

Anatomical classification of veins (paracardiac, trunk, extraorgan and intraorgan). Classification of veins by the wall structure. Roots and tributaries of veins. Superficial veins, deep veins. Venous grid, venous plexus. Sources and mechanisms of the trunk veins development. Variations and abnormalities of the trunk veins development. Works of M.A.Tykhomyrov. Age features of veins. X-ray anatomy of veins.

Superior vena cava: roots, tributaries, topography. Azygos vein: formation, topography, classification of tributaries, areas of venous blood inflow.

Hemiazygos vein: formation, topography, classification of tributaries, areas of venous blood inflow. Veins of the spinal column.

Inferior vena cava: roots, topography, classification of tributaries. Parietal and visceral tributaries of the inferior vena cava, areas of venous blood inflow.

Hepatic portal vein: roots, topography, tributaries. Superior mesenteric vein: topography, tributaries, area of venous blood inflow. Inferior mesenteric vein: topography, tributaries, area of venous blood inflow. Splenic vein: topography, tributaries, area of venous blood inflow. Branching of hepatic portal vein in the liver.

Common iliac vein: roots, topography. Internal iliac vein: topography, tributaries. Venous plexus of the pelvic organs.

Venous intersystem anastomoses. Venous intersystem anastomoses cava-caval anastomoses, porto-caval anastomoses and porto-cava-caval anastomoses.

Classification of lymph vessels. Lymphatic capillaries: wall structure and function. Lymph postcapillaries: wall structure and function. Lymphatic vessels (extraorgan and intraorgan): wall structure and function. Superficial and deep lymph vessels. Lymphatic trunks: jugular, subclavian, broncho-mediastinal, lumbar, intestinal - their formation, topography, function. Lymph ducts: the thoracic duct, right lymphatic duct. Development of lymphatic vessels in embryogenesis. Variants and abnormalities of lymph ducts development. Works of the Kyiv anatomical school. Age-related structural features of lymphatic vessels.

Lymph nodes. Lymph nodes of the chest: classification. Ways outflow of lymph from the lungs, heart and esophagus. Lymph nodes of the abdomen: classification. Pelvic lymph nodes. Lymphatic vessels and regional lymph nodes of the stomach, small intestine, colon, liver, kidney, uterus, ovary. Superficial and deep lymph vessels of the upper extremity. Lymph nodes of the upper limb: classification. Ways of lymph outflow from the breast. Superficial and deep lymphatic vessels of the lower limbs. The lymph nodes of the lower limb: classification.

**Topic 67. Anatomy of the autonomic part of the peripheral nervous system. Vascularization and innervation of the walls and organs of the chest cavity, abdominal cavity and pelvic cavity. Thematic module 11 "Anatomy of the heart. Vessels and nerves of the trunk".**

General patterns of the structure and function of the autonomic peripheral nervous system (autonomic nervous system). Morphological differences in the structure of the somatic nervous system and autonomic nervous system. Morphological differences in the structure of the reflex arc of the somatic nervous system and autonomic nervous system. Sympathetic and parasympathetic parts of the autonomic nervous system: morphological, functional differences, innervations objects. Centers of the autonomic nervous system in the brain and spinal cord. The peripheral division of the autonomic nervous system: autonomic nodes, nerves, autonomic plexus. Classification of autonomic nodes, their topography, preganglionic and postganglionic nerve fibers.

The sympathetic part of the autonomic nervous system. Centers in the spinal cord. Sympathetic trunk: topography, classification of nodes, interstitial branches. White and gray connecting branches: formation, topography. The branches of the cervical sympathetic trunk nodes, their topography and areas of innervation. Sympathetic roots of autonomic nodes of the head. The branches of the thoracic sympathetic trunk nodes, their topography, areas of innervation. The branches of the lumbar sympathetic trunk nodes, their topography, areas of innervation. The branches of the sacral sympathetic trunk nodes, their topography, areas of innervation.

Parasympathetic part of the autonomic nervous system. Cranial part: autonomic nodes of the head, their topography, roots, branches, areas of innervations. Pelvic part.

Visceral plexus: cranio-cervical part, thoracic part, abdominal part, pelvic part. Cranial-cervical part of visceral plexus: common carotid plexus, internal carotid plexus, external carotid plexus, subclavian plexus - their formation, areas of innervation. Thoracic part of visceral plexus: thoracic aortic plexus, cardiac plexus, esophageal plexus, pulmonary plexus - their formation, areas of innervation.

Abdominal part of visceral plexus: abdominal aortic plexus: its secondary plexus, their topography and components, areas of innervation. Sources of formation, composition of fibers of the abdominal aortic plexus. Pelvic part of visceral plexus: upper hypogastric plexus, splanchnic pelvic nerves, inferior hypogastric plexus. Inferior hypogastric plexus: its secondary plexus, their topography, areas of innervation. Sources of formation, composition of fibers of the inferior hypogastric plexus.

Vascularization (arterial blood supply, venous and lymphatic outflow) and innervation of the walls and organs of the chest cavity: anterior, posterior and lateral walls of the chest cavity, diaphragm, trachea, bronchi, lungs, pleura, heart, core, esophagus.

Vascularization (arterial blood supply, venous and lymphatic outflow) and innervation of the walls and organs of the abdomen: anterior, posterior and lateral walls of the abdominal cavity, spinal cord, liver, gall bladder, stomach, small intestine (duodenum, ileum and jejunum), colon, pancreas, kidneys, adrenal glands, spleen

Vascularization (arterial blood supply, venous and lymphatic outflow) and innervation of the walls and organs of the pelvic cavity: the walls of the pelvis, perineum, urinary bladder, urethra, ovaries, uterus, fallopian tubes, vagina, external female genitalia, testicles, vas deferens, seminal vesicles, prostate, external male genitalia.

### **Thematic module 12. Vessels and nerves of the upper and lower extremities.**

#### **Topic 68. Vessels of the upper extremity.**

Arteries of the upper limb. Axillary artery: topography, parts, branches, areas of blood supply. Brachial artery: topography, branches, areas of blood supply. Radial artery: topography, branches, areas of blood supply. Ulnar artery: topography, branches, areas of blood supply. Rete articulare cubiti: sources of formation. Dorsal carpal network: topography, sources of formation, branches, areas of blood supply. Palmar carpal network: topography, sources of formation, areas of blood supply. The superficial palmar arch: topography, sources of formation, areas of blood supply. Deep palmar arch: topography, sources of formation, areas of blood supply. Arterial anastomoses of the upper extremity. Projections of upper extremity arteries to the skin.

The veins of the upper limb: classification. Superficial and deep veins of the upper extremity: their characteristics, patterns of topography and structure. Axillary vein: topography, tributaries.

#### **Topic 69. Introduction to the peripheral nervous system. Brachial plexus: short and long branches.**

Brachial plexus: sources of formation, topography. Trunks of the brachial plexus. Classification of branches. Supraclavicular part: short branches of the brachial plexus, their topography and areas of innervation. Subclavian part: beams of the brachial plexus. Long branches of the brachial plexus: formation, topography, areas of innervation. Projection of long branches of the brachial plexus to the skin. Topographic and anatomical relationship between nerves and blood vessels of the upper extremities.

#### **Topic 70. Vessels of the lower extremity.**

The arteries of the lower extremities. External iliac artery: topography, branches, areas of blood supply. Femoral artery: topography, branches, areas of blood supply. Popliteal artery: topography, branches, areas of blood supply. Anterior tibial artery: topography, branches, areas of blood supply. Posterior tibial artery: topography, branches, areas of blood supply. Articular knee network: sources of formation. Lateral malleolar network: topography, sources of formation, areas of blood supply. Medial malleolar network: topography, sources of formation, areas of blood supply. The arteries of the foot: dorsal artery of foot, lateral plantar artery, medial plantar artery - their topography, branches, areas of blood supply. Arterial anastomoses of the lower limbs. The projection of the lower extremity arteries to the skin.

The veins of the lower limb: classification. Superficial and deep veins of the lower limbs: their characteristics, patterns of topography and structure.

Deep and superficial lymphatics of lower limb. Lymphatics nodes of lower limb and their classification.

#### **Topic 71. Somatic nervous plexus: lumbar, sacral, coccygeal. Vascularization and innervation of the upper and lower extremities. Blood supply and innervation of the muscles of the back. Thematic module 12 "Vessels and nerves of the upper and lower extremities".**

Lumbar plexus: sources of formation, topography, branches, areas of innervations. Sacral plexus: sources of formation, topography, classification of branches. Short branches of the sacral plexus: topography, areas of innervation. Long branches of the sacral plexus: topography, areas of innervation. Coccygeal plexus: sources of formation, topography, branches, areas of innervations.

Vascularization (arterial blood supply and venous drainage) and innervation of the upper extremity joints: upper extremity joints, shoulder joint, elbow joint, wrist joint

Vascularization (arterial blood supply, venous and lymphatic outflow) and the innervation of the muscles of the upper extremity: shoulder girdle muscles, shoulder muscles, forearm muscles, muscles of the hand.

Vascularization (arterial blood supply and venous drainage) and innervation of the lower extremity joints: hip, knee, ankle joint.

Vascularization (arterial blood supply, venous and lymphatic outflow) and the innervation of the skin and muscles of the lower extremities: muscles of the pelvis, thigh muscles, leg muscles, muscles of the foot.

Vascularization (arterial blood supply, venous and lymphatic outflow) and innervation of back muscles, chest and abdomen muscles.

### 3. Structure of Human Anatomy Course

Topic	Lectures	Practical lessons	Student's independent work	Ind. work
<b>I semester</b>				
<i><b>Thematic module 1. Introduction to Anatomy. Anatomy of bones.</b></i>				
1. Subject and tasks of anatomy. Research methods in anatomy. The main directions of modern anatomy development. Development of Ukrainian anatomical schools. Kyiv anatomical school. Lviv anatomical school. The main stages of ontogenesis. Classification of tissues. Anatomical nomenclature. Axes and planes of the body. Bone as an organ. Classification of bones. Bone development in embryogenesis. Types of ossification. Bones of the trunk.	2	2	14	
2. Osteology. Frontal, parietal, occipital and ethmoidal bones.		2		
3. Sphenoid and temporal bones. Canals of temporal bone.		2		
4. Viscerocranium. Orbit and bony nasal cavity.		3		
5. External and internal base of the skull. Temporal, infratemporal and pterygopalatine fossae.		3	12	
6. Bones of upper limb.		2		
7. Bones of lower limb.		2	6	
8. Practical skills and summary of anatomy of bones		3		
<b>Total of thematic modul 1</b>	<b>2</b>	<b>19</b>	<b>32</b>	
<i><b>Thematic module 2. Articulations.</b></i>				
9. Anatomy of movable and immovable joints between bones. Development of joints between the bones in ontogenesis. Articulations of trunk and head.	2	3	8	
10. Articulations of upper limb.		3		
11. Articulations of lower limb. Practical skills and summary of anatomy of bones and their articulations.		3	7	
<b>Total of thematic modul 2</b>	<b>2</b>	<b>9</b>	<b>15</b>	
<i><b>Thematic module 3. Myology.</b></i>				
12. Muscle as an organ. Classification of muscles. Development of skeletal muscles. Muscles and fascia of back.	2	2		
13. Muscles and fascia of the thorax. Diaphragm.		2		
14. Muscles and fascia of the abdomen. Rectus sheath. Inguinal canal. Linea alba.		2	10	
15. Muscles and fascia of head.		2		
16. Muscles and fascia of neck. Topography of the neck.		3	10	
17. Muscles of upper limb.		2	6	
18. Fasciae and topography of upper limb.		2		
19. Muscles of lower limb.		2	8	
20. Fasciae and topography of lower limb. Practical skills and summary of the material in myology.		3		
<b>Total of thematic modul 3</b>	<b>2</b>	<b>20</b>	<b>34</b>	
<b>Final control</b>	<b>6</b>	<b>48</b>	<b>81</b>	
<b>II semester</b>				
<i><b>Thematic module 4. Digestive system.</b></i>				
21. Introduction to splanchnology. Classification of internal organs. Anatomy of the oral cavity and its derivatives. Palate. Anatomy of tongue. Salivary glands	2	3		
22. Anatomy of teeth. Dento-maxillary system		3	14	

23. Anatomy of pharynx, esophagus. Anatomy of stomach. Regions of the anterior abdominal wall		3		
24. Anatomy of the small and large intestine.		3	7	
25. Liver. Gall bladder. Pancreas		3		
26. Anatomy of the peritoneum		3	7	
27. Practical skills and summary of the material on anatomy of the digestive system.		3		
<b>Total of the thematic module 4</b>	<b>2</b>	<b>21</b>	<b>28</b>	
<i><b>Thematic module 5. Anatomy of the respiratory system.</b></i>				
28. General anatomy of the respiratory system. Embryogenesis of the respiratory organs. Embryogenesis of the respiratory system.	1	3	8	
29. Anatomy of the trachea, main bronchi, lungs. Pleura. Mediastinum. Practical skills and summary of the material on anatomy of the respiratory system.	1	3		
<b>Total of the thematic module 5</b>	<b>2</b>	<b>6</b>	<b>8</b>	
<i><b>Thematic module 6. Urogenital, endocrine and immune systems.</b></i>				
30. General anatomy of the urinary system. Embryogenesis of the urinary system. Abnormalities and variants of the of urinary system development	2	3	8	
31. Anatomy of the male genital organs. Perineum.	1	3		
32. Anatomy of the female genital organs. Mammary gland	1	3	8	
33. Anatomy of the immune system organs.	1	3		
34. Anatomy of the organs of endocrine system	1	3	8	
35. Practical skills of urogenital, endocrine and immune systems.		3		
<b>Total of the thematic module 6</b>	<b>6</b>	<b>18</b>	<b>24</b>	
<i><b>Thematic module 7. Anatomy of the central nervous system.</b></i>				
36. Introduction to the CNS. General principles of reflex arcs structure. Gray and white matter of the CNS. External and internal structure of the spinal cord. Development of the central nervous system in ontogenesis and phylogenesis	2	3		
37. Embryogenesis of the brain. Anatomy of the medulla oblongata and pons		3		
38. Anatomy of cerebellum. IV ventricle. Rhomboid fossa.		3		
39. Anatomy of the midbrain		3		
40. Anatomy of the interbrain		3		
41. The main parts of cerebral cortex. Rhinencephalon. Lateral ventricles		3		
42. Pallium. Localization of functional centers in the cortex of telencephalon		3		
43. Basal nuclei. White matter of hemispheres		3	8	
44. Meninges of the spinal cord and brain. Formation and circulation of cerebrospinal fluid.		3	8	
45. Afferent pathways of CNS.	1	3	8	
46. Efferent pathways of CNS.	1	3		
47. Practical skills, summary of material of the central nervous system anatomy.		3		
<b>Total of the thematic module 7</b>	<b>4</b>	<b>36</b>	<b>24</b>	
<i><b>Thematic module 8. Sensory organs.</b></i>				
48. Anatomy of the sensory system. Anatomy of the organ of vision. Conducting pathway of vision.	1	3		
49. Anatomy of organ of hearing and balancing. Conducting pathways	1	3		
50. Olfactory system. Gustatory system. Skin and its derivatives. Conducting pathways		3	8	
51. Practical skills and summary of the sensory system anatomy.		3		
<b>Total of the thematic module 8</b>	<b>2</b>	<b>12</b>	<b>8</b>	

<i>Thematic module 9. Cranial nerves. Spinal nerves.</i>			
52. Introduction to the peripheral nervous system. Classification of cranial nerves. I,II,III,IV,VI,VIII cranial nerves		3	
53. Trigeminal nerve		3	
54. VII pair of cranial nerves. Autonomic ganglia of head		3	
55. IX,X,XI,XII pairs of cranial nerves		3	7
56. Spinal nerves. Cervical plexus. Thoracic nerves		3	
57. Practical skills and summary of the anatomy of head and neck nerves.		2	
<b>Total of the thematic module 9</b>		<b>17</b>	<b>7</b>
<b>Final control</b>	<b>16</b>	<b>110</b>	<b>99</b>
III semester			
<i>Thematic module 10. Vessels of the head and neck.</i>			
58. Aorta its branches. Common and external carotid arteries	2	3	6
59. Internal carotid artery and subclavian artery		3	6
60. Veins of head and neck. Lymphatics of the head and neck		3	8
61. Practical skills and summary of cranial nerves and vessels of the head and neck anatomy		3	
<b>Total of the thematic module 10</b>	<b>2</b>	<b>12</b>	<b>20</b>
<i>Thematic module 11. Anatomy of the heart. Vessels and nerves of the trunk.</i>			
62. Anatomy of the heart (I): Topography, chambers of the heart. Systemic and pulmonary circulation.	2	3	
63. Anatomy of the heart (II): structure of the cardiac wall, blood and nerve supply of the heart. Pericardium		3	8
64. Aorta. Thoracic aorta. Abdominal aorta (parietal and paired visceral branches).		3	8
67. Abdominal aorta (unpaired visceral branches) Arteries of pelvic cavity.			
65. General anatomy of the veins. Veins of the trunk. Intrasystemic and intersystemic venous anastomoses. General anatomy of the lymphatic vessels.		3	
66. Anatomy of the autonomic peripheral nervous system. Sympathetic part and parasympathetic part of ANS	2	3	6
67. Vascularization and innervation of the walls and organs of the chest cavity, abdominal cavity and pelvic cavity. Practical skills and summary of the anatomy of the heart, blood vessels and nerves of the trunk	2	3	
<b>Total of the thematic module 11</b>	<b>6</b>	<b>18</b>	<b>22</b>
<i>Thematic module 12. Vessels and nerves of the upper and lower extremities.</i>			
68. Vessels of the upper extremity.		3	
69. Brachial plexus	2	3	
70. Vessels of lower limb		3	6
71. Spinal nerves. Somatic nerve plexus: lumbar, sacral, coccygeal. Vascularization and innervation of the upper and lower extremities. Blood supply and innervation of the muscles of the back. Practical skills and summary of anatomy of blood vessels and nerves of the upper and lower extremities.		3	5
<b>Total of the thematic module 12</b>	<b>2</b>	<b>12</b>	<b>11</b>
<b>Final assessment</b>	<b>10</b>	<b>42</b>	<b>53</b>
<b>Total hours -465/ 15,5 ECTS credits</b>	<b>32</b>	<b>200</b>	<b>233</b>
<b>Classroom work – 50%, SWS –50%</b>			

**4. Thematic plans of lectures from the course “Human Anatomy” for the students of medical faculty**  
**Plan of the lectures**

№	Topic	Hours
	<b>Thematic module 1. Introduction to Anatomy. Anatomy of bones</b>	
1	General osteology. Bone as an organ. Classification. Development. Types of ossification	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 2. Articulations</b>	

2	General arthrology. Classifications of the joints. Structure and function of Joints	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 3. Anatomy of muscles</b>	
3	General myology. Muscle as an organ. Structure and function of muscles. Classification. Development of muscles. Elements of biomechanics	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 4. Digestive system</b>	
4	Introduction to splanchnology. General anatomy of digestive system	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 5. Respiratory system</b>	
5	General anatomy of respiratory system	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 6. Urogenital, endocrine and immune systems</b>	
6	General anatomy of urinary organs	2
7	General anatomy of female genital organs. General anatomy of male genital organs.	2
8	General anatomy of immune system organs. General anatomy of endocrine system organs.	2
	<b>Total</b>	<b>6</b>
	<b>Thematic module 7. Anatomy of CNS</b>	
9	Introduction to CNS. Anatomy of spinal cord	2
10	Conducting pathways	2
	<b>Total</b>	<b>4</b>
	<b>Thematic module 8. Sensory organs</b>	
11	Anatomy of sensory organs. Anatomy of organ of vision. Anatomy of organ of hearing and balancing. Organs of smell and taste. Skin and its derivatives.	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 10. Vessels of head and neck</b>	
12	Anatomy of heart	2
	<b>Total</b>	<b>2</b>
	<b>Thematic module 11. Vessels and nerves of trunk</b>	
13	Cardiovascular system. Anatomy of arteries	2
14	General anatomy of venous and lymphatic systems	2
15	Anatomy of somatic part of PNS. Cranial and spinal nerves	2
	<b>Total</b>	<b>6</b>
	<b>Thematic module 12. Vessels and nerves of limbs</b>	
16	Anatomy of autonomic part of PNS. Autonomic plexuses	2
	<b>Total</b>	<b>2</b>
	<b>Total lecture hours from course "Human Anatomy"</b>	<b>32</b>

#### 5. Thematic plan of practical lessons

№	Topic	Hours
	<b>Thematic module 1. Introduction to Anatomy. Anatomy of bones</b>	
1	Anatomical terminology. Fundamental planes and axes in the body. General features of the vertebrae. Cervical, thoracic and lumbar vertebrae. Sacrum, coccyx, ribs, sternum.	2
2	Frontal, parietal, occipital, ethmoidal bones	2
3	Sphenoid bone, temporal bone. Canals of temporal bone	2
4	Viscerocranium. Orbit. Nasal cavity	3
5	External and internal base of the skull. Temporal fossa, infratemporal fossa, pterygopalatine fossa	3
6	Bones of the upper limb	2
7	Bones of the lower limb	2
8	Practical skills from osteology. Thematic module 1 "Introduction to Anatomy. Anatomy of bones"	3
	<b>Total</b>	<b>19</b>
	<b>Thematic module 2. Articulations</b>	
9	General arthrology. Articulations of the thorax and vertebral column. Articulations of the skull	3
10	Articulations of upper limb	3
11	Articulations of lower limb. Practical skills from Arthrology. Thematic module 2 "Articulations"	3
	<b>Total</b>	<b>9</b>
	<b>Thematic module 3. Anatomy of muscles.</b>	
12	Muscles and fasciae of the back	2
13	Muscles and fasciae of the chest. Diaphragm	2

14	Muscles and fasciae of the abdomen. Rectus sheath. Inguinal canal. Linea alba	2
15	Muscles and fasciae of the head	2
16	Muscles and fasciae of the neck. Topography of the neck	3
17	Muscles of the upper limb	2
18	Fasciae and topography of the upper limb	2
19	Muscles of the lower limb	2
20	Fasciae and topography of the lower limb Practical skills from Myology. Thematic module 3. Anatomy of muscles	3
	<b>Total</b>	<b>20</b>
	<b>Thematic module 4. Digestive system</b>	
21	Anatomy of oral cavity and its derivatives. Tongue, palate, teeth, salivary glands	3
22	Teeth. Dento-maxillary system	3
23	Anatomy of pharynx and esophagus and stomach. Regions of the anterior abdominal wall	3
24	Anatomy of small and large intestine	3
25	Anatomy of liver, gall bladder and pancreas	3
26	Anatomy of peritoneum	3
27	Practical skills of digestive system anatomy. Thematic module 4. Splanchnology. Anatomy of digestive system”	3
	<b>Total</b>	<b>21</b>
	<b>Thematic module 5. Respiratory system</b>	
28	Anatomy of external nose. Nasal cavity. Larynx	3
29	Anatomy of trachea, bronchi and lungs. Pleura. Mediastinum. Thematic module 5: “Respiratory system”	3
	<b>Total</b>	<b>6</b>
	<b>Thematic module 6. Urogenital, endocrine and immune systems</b>	
30	Anatomy of kidney, ureter, urinary bladder and urethra.	3
31	Anatomy of male genital organs. Perineum	3
32	Anatomy of female genital organs. Mammary gland.	3
33	Anatomy of immune organs. Thymus, bone marrow, spleen, lymphatic nodes, tonsils.	3
34	Anatomy of endocrine glands. Thyroid and parathyroid glands. Adrenal gland. Pituitary gland. Pineal body. Endocrine part of pancreas	3
35	Practical skills of anatomy of urogenital, endocrine and immune system. Thematic module 6. “Urogenital, endocrine and immune systems”	3
	<b>Total</b>	<b>18</b>
	<b>Thematic module 7. Anatomy of CNS</b>	
36	Introduction to CNS. Anatomy of spinal cord	3
37	Embryogenesis of brain. Anatomy of medulla oblongata and pons	3
38	Anatomy of cerebellum. 4 <sup>th</sup> ventricle. Rhomboid fossa	3
39	Anatomy of midbrain	3
40	Anatomy of interbrain. III ventricle.	3
41	Cerebral cortex. Its main parts and functions. Rhinencephalon	3
42	Pallium. Localization of cortical centers.	3
43	Basal nuclei. White matter of cerebral hemispheres. Lateral ventricles	3
44	Meninges of brain and spinal cord. Production and circulation of cerebrospinal fluid. Running of 12 pairs of cranial nerves from the brain and skull.	3
45	Ascending pathways of CNS	3
46	Descending pathways of CNS	3
47	Practical skills from anatomy of central nervous system. Thematic module 7. “Anatomy of CNS”	3
	<b>Total</b>	<b>36</b>
	<b>Thematic module 8. Sensory organs</b>	
48	Anatomy of eyeball and its appendages. Conducting pathway of vision	3
49	Organ of hearing and balancing. Conducting pathways	3
50	Organ of smelling, taste and their conducting pathways. Skin and its derivatives. Conducting pathways.	3
51	Practical skills from anatomy of organs of special senses. Thematic module 8 “Sensory organs”	3
	<b>Total</b>	<b>12</b>
	<b>Thematic module 9. Cranial nerves. Spinal nerves.</b>	
52	Classification of cranial nerves. I, II, III, IV, VI, VIII pairs of cranial nerves	3

53	V pair of cranial nerves	3
54	VII cranial nerve. Autonomic ganglia of head and neck	3
55	IX, X, XI, XII pairs of cranial nerves	3
56	Spinal nerves. Formation of somatic plexuses. Cervical plexus. Thoracic nerves	3
57	Practical skills of anatomy of cranial and spinal nerves. Thematic module 9 “Cranial nerves. Spinal nerves.”	2
	<b>Total</b>	<b>17</b>
	<b>Thematic module 10. Vessels of head and neck.</b>	
58	Aorta. Branches of aortic arc. Common carotid artery. External carotid artery	3
59	Internal carotid artery. Subclavian artery	3
60	Veins of head and neck. Lymphatic nodes and vessels of head and neck	3
61	Practical skills of blood supply, lymph outflow and nerve supply of organs of head and neck. Thematic module 10 “Vessels of head and neck”	3
	<b>Total</b>	<b>12</b>
	<b>Thematic module 11. Vessels of head and neck.</b>	
62	The heart (I): Topography. Chambers of the heart. Systemic and pulmonary circulation	3
63	The heart (II): Structure of the cardiac wall. Conducting system of the heart. Pericardium. Vascularization and innervation of the heart.	3
64	Aorta. Thoracic aorta. Abdominal aorta (parietal and paired visceral branches).	3
65	Abdominal aorta (unpaired visceral branches). Arteries of pelvic cavity.	3
66	Veins of the thoracic cavity. Vena azygos and vena hemiazygos. Vena porta, vena cava inferior and veins of pelvic cavity. Porto-caval and caval-caval venous shunts. Lymphatics of thoracic, abdominal cavities and pelvic cavities.	3
67	Sympathetic part of the autonomic nervous system. Parasympathetic part of the autonomic nervous system. Autonomic plexuses of the thoracic, abdominal and pelvic cavities. Practical skills of blood and nerve supply of the thoracic, abdominal and pelvic cavities. Thematic module 11 “Vessels of head and neck.”	3
	<b>Total</b>	<b>18</b>
	<b>Thematic module 12. Vessels and nerves of limbs.</b>	
68	Vessels of upper limb	3
69	Plexus brachialis	3
70	Vessels of lower limb	3
71	Plexus lumbalis. Plexus sacralis and coccygeus. Practical skills from anatomy of arteries, veins, nerves, lymphatic vessels and nodes of the upper and lower limbs. Thematic module 12 “Vessels and nerves of limbs.”	3
	<b>Total</b>	<b>12</b>
	<b>Total hours on practical lesson of course “Human Anatomy”</b>	<b>200</b>

### 6. The self-work study of medical faculty students

#### *Types of self-work of students (SWS) and its control*

1	Describe the main stages of anatomy history of Ukrainian anatomical schools in the XX - XXI centuries. Lviv anatomical school.	6	Current control on the practical classes
2	Periods of ontogenesis. Embriogenesis	4	
3	Methods of anatomical investigation. Anatomical nomenclature. Constitutional types of human body	4	
4	Individual characteristics form of the cranium (schematically)	12	
5	Thorax as a whole. Pelvis as a whole.	6	
	<b>Total</b>	<b>32</b>	
	<b>Thematic module 2. Articulations.</b>		
1	Biomechanics of joints	8	Current control on the practical classes
2	Articulations of the foot. Shoparts and Lisfranks joints. The forces that hold the joint	7	
	<b>Total</b>	<b>15</b>	
	<b>Thematic module 3. Anatomy of the muscles.</b>		
1	Interfascial spaces of the neck. Neck topography (schematic).	10	Current control on the practical classes
2	Weak areas of the abdominal wall.	10	
3	Muscle groups that conduct movements in the shoulder, elbow and radial-carpal joint.	6	
4	Muscle groups that conduct movements in the femoral, knee, and ankle joints	8	
	<b>Total</b>	<b>34</b>	
	<b>Total on the I semester</b>	<b>81</b>	
	<b>Thematic module 4. Digestive system.</b>		

1	Development of teeth. Variants and developmental anomalies of permanent and deciduous teeth.	7	Current control on the practical classes
2	Physiological types of occlusion (bite) (schematically)	7	
3	Variants of location of appendix vermiformis and projection of pain points onto the anterior abdominal wall in case of appendicitis.	7	
4	Formation of peritoneum (schematically)	7	
<b>Total</b>		<b>28</b>	
<b>Thematic module 5. Respiratory system.</b>			
1	Developmental anomalies of respiratory system	8	Current control on the practical classes
<b>Total</b>		<b>8</b>	
<b>Thematic module 6. Urogenital, endocrine and immune systems.</b>			
1	Functional anatomy of endocrine system organs	8	Current control on the practical classes
2	Schematic representation of the structural and functional units of parenchymal organs.	8	
3	X-ray anatomy of the digestive, respiratory, urinary and reproductive systems.	8	
<b>Total</b>		<b>24</b>	
<b>Thematic module 7. Anatomy of the central nervous system</b>			
1	Associative, commissural, and projective pathways (schematically)	8	Current control on the practical classes
2	Circulation of cerebrospinal fluid (schematically)	8	
3	Points of origin of the 12 cranial nerves in the brain, and points of their exit from the skull	8	
<b>Total</b>		<b>24</b>	
<b>Thematic module 8. Sensory organs.</b>			
1	Derivatives of skin	8	Current control on the practical classes
<b>Total</b>		<b>8</b>	
<b>Thematic module 9. Cranial nerves. Spinal nerves</b>			
1	Projection of nuclei of cranial nerves III and XII	7	Current control on the practical classes
<b>Total</b>		<b>7</b>	
<b>Total in the II semester</b>		<b>99</b>	
<b>Thematic module 10. Vessels of head and neck.</b>			
1	The cerebral arterial circle of Willis	6	Current control on the practical classes
2	Lymph nodes of the head. Lymph drainage from the organs of the neck.	8	
3	The pterygoid venous plexus.	6	
<b>Total</b>		<b>20</b>	
<b>Thematic module 11. Anatomy of the heart. Vessels and nerves of the trunk</b>			
1	Fetal circulation.	8	Current control on the practical classes
2	Inter- and intrasystemic arterio-venous anastomoses.	8	
3	Porto-caval, cava-caval anastomoses.	6	
<b>Total</b>		<b>22</b>	
<b>Thematic module 12. Vessels and nerves of the extremities.</b>			
1	Arterial nets of the upper and lower limbs.	6	Current control on the practical classes
2	Areas of sensitive and motor innervation by somatic plexuses of the upper and lower limbs.	5	
<b>Total</b>		<b>11</b>	
<b>Total for the 2<sup>nd</sup> semester</b>		<b>53</b>	
<b>Total of SWS</b>		<b>233</b>	

7. Individual tasks are not provided in the curriculum.

#### 8. Teaching methods:

- visual method (teacher demonstrates the preparations of bones, joints, organ complexes, museum preparations; use of atlases, textbook illustrations, tables, etc.);
- practical method (students' work with preparations of bones, joints, organ complexes, museum preparations, solving tests, situational problems);
- verbal method (explanation by the teacher of unclear questions on the previous topic of the lesson or lecture, explanation by the teacher of the topic of the current practical lesson, lecture)
- working with a book (writing notes by students during self-training and performing independent work)

- video method (use of an interactive table, thematic videos, multimedia presentations of lectures in the lecture course).

### **9. Control methods:**

Current control is based on the control of theoretical knowledge, practical skills and abilities.

Types of control:

1. Oral survey (frontal, individual, combined)
2. Practical test existing professional skills
3. Test control (open and closed tests)

Self work of students is evaluated at workshops and is part of the final grade of the student.

Final control is carried out in the form of a written exam that includes:

1. Test control of knowledge. The student receives a version of the test task, which includes 40 test tasks from the Step-1 database from 2006-2022 and contains test tasks from all studied sections of the discipline. The database of tests is open throughout the entire course.
2. Written work. The student receives a ticket with 4 questions, to which he gives a written answer. The list of exam questions is open throughout the entire course.

**10. Current control** is carried out during training sessions and is aimed at checking the students' assimilation of educational material (it is necessary to describe the forms of current control during training sessions on a 4-point (national) scale). Forms of assessment of current educational activities should be standardized and include control of theoretical and practical training.

Test control: a student in the MISA system receives 10 tests, answers and receives the result in points (from 0 to 10) and percentages (from 0 to 100).

Demonstration of a practical skill: the student must be able to demonstrate each structure that is listed in the practical skills.

Answer to the teacher's question: the teacher examines the lesson material.

**10.1 Assessment of current educational activities.** During the evaluation of the mastery of each topic for the current educational activity, the student is assigned a 4-point (national) grade. At the same time, all types of work provided for by the discipline program are taken into account. The student must receive a grade on each topic for further conversion of grades into points on a multi-point (200-point) scale.

Test control:

from 5-6 (50-60%) – satisfactory; 7-8 (70-80%) – good; 9-10 (90-100%) - excellent.

Demonstration of a practical skill: the student must be able to demonstrate all the structures that are listed in the practical skills.

Answering the teacher's questions: the student answered all the teacher's questions, demonstrated the ability to think logically – excellent, the student answered all the teacher's questions, demonstrated the ability to think logically, made 1-2 mistakes in Latin terms - good, the student answered all the teacher's questions, demonstrated the ability to think logically - confused in Latin terms – satisfactory.

### **11. Form of final control of study success (exam).**

The semester exam is a form of final control of the student's assimilation of theoretical and practical material from the academic discipline.

The exam is conducted only in written form and consists of two parts:

1. Test control of knowledge. The student receives a version of the test task, which includes 40 test tasks from the Step-1 database of 2006-2022 and contains test tasks from all studied sections of the discipline. The database of tests is open throughout the entire course. Each correct test answer is counted as 1 point. The maximum possible number of points obtained for the test control is 40 points.
2. Written work. The student receives a ticket with 4 questions, to which he gives a written answer. The list of exam questions is open throughout the entire course. Each written question is evaluated from 0 to 10 points. The maximum possible number of points received for written work is 40 points. The minimum number of points for the exam is 50 points.

In the case of distance learning, the exam will be carried out in accordance with the rector's order.

### **12. For courses which form the final control is test:**

The maximum number of points that a student can collect for current educational activity per semester for admission to exam is 200 points.

The minimum number of points that a student must collect for current educational activity per semester for admission to exam is 120 points.

Calculating the number of points is based on student evaluations received by traditional scale while learning subjects by calculating the arithmetic average (AA), rounded to two decimal places. The resulting value is converted into points by multi-scale as follows:

$$x = \frac{CA \times 200}{5}$$

Table 1

Conversion of the average score for current activity in multi point scale for courses that are completed by Recalculation of the average grade for the current activity into a multi-point scale for disciplines ending with credit

4- point scale	200-point scale						
5	200	4.45	178	3.92	157	3.37	135
4.97	199	4.42	177	3.89	156	3.35	134
4.95	198	4.4	176	3.87	155	3.32	133
4.92	197	4.37	175	3.84	154	3.3	132
4.9	196	4.35	174	3.82	153	3.27	131
4.87	195	4.32	173	3.79	152	3.25	130
4.85	194	4.3	172	3.77	151	3.22	129
4.82	193	4.27	171	3.74	150	3.2	128
4.8	192	4.24	170	3.72	149	3.17	127
4.77	191	4.22	169	3.7	148	3.15	126
4.75	190	4.19	168	3.67	147	3.12	125
4.72	189	4.17	167	3.65	146	3.1	124
4.7	188	4.14	166	3.62	145	3.07	123
4.67	187	4.12	165	3.57	143	3.02	121
4.65	186	4.09	164	3.55	142	3	120
4.62	185	4.07	163	3.52	141	Less than 3	Not enough
4.6	184	4.04	162	3.5	140		
4.57	183	4.02	161	3.47	139		
4.52	181	3.99	160	3.45	138		
4.5	180	3.97	159	3.42	137		
4.47	179	3.94	158	3.4	136		

For courses which form the final control is exam:

The maximum number of points that a student can collect for current educational activity per semester for admission to exam is 120 points.

The minimum number of points that a student must collect for current educational activity per semester for admission to exam is 72 points.

Calculating the number of points is based on student evaluations received by traditional scale while learning subjects by calculating the arithmetic average (AA), rounded to two decimal places. The resulting value is converted into points by multi-scale as follows:

$$x = \frac{CA \times 120}{5}$$

Table 2

Conversion of the average score for current activity in multi point scale for courses that are completed by exam

4- point scale	200-point scale						
5	120	4.45	107	3.91	94	3.37	81
4.95	119	4.41	106	3.87	93	3.33	80

4.91	118		4.37	105		3.83	92		3.29	79
4.87	117		4.33	104		3.79	91		3.25	78
4.83	116		4.29	103		3.74	90		3.2	77
4.79	115		4.25	102		3.7	89		3.16	76
4.75	114		4.2	101		3.66	88		3.12	75
4.7	113		4.16	100		3.62	87		3.08	74
4.66	112		4.12	99		3.58	86		3.04	73
4.62	111		4.08	98		3.54	85		3	72
4.58	110		4.04	97		3.49	84		Less than	Not
4.54	109		3.99	96		3.45	83	3		enough
4.5	108		3.95	95		3.41	82			

Self work of students is evaluated during the current control of theme on the appropriate lesson. Learning of themes which dart out only on self work are controlled at the final control.

The maximum number of points that a student can get in the passing the examination is 80. The minimum number of points in the passing the examination - at least 50.

Evaluation of the discipline, which culminating with exam is defined as the sum of points for current educational activity (at least 72) and points for the exam (at least 50).

Evaluation of the disciplines, the final form control of which is a test (differentiated test) is based on the sum of points for current educational activity (at least 72) and points for the exam (at least 50).

Points of ECTS scale not converted in 4-point scale and vice versa because the ECTS scale and 4-point scale are independent.

Points of students who study in one specialty, considering the number of scored points, are ranked on a ECTS scale as follows:

Evaluation of ECTS	Statistical index
A	Top 10% of students
B	Next 25% of students
C	Next 30% of students
D	Next 25% of students
E	The last 10% of students

Ranking with the assignment of grades "A", "B", "C", "D", "E" is carried out for students of this course who are studying in one specialty and have successfully completed the study of the discipline. Students who receive grades of FX, F ("2") are not listed as ranked students. Students with an FX grade automatically receive an "E" grade after retaking.

Points of discipline for students who successfully completed the program are converted in traditional 4-point scale by absolute criteria, which are listed in the table below:

Table 4:

Points from discipline	Score in 4-point scale
from 170 to 200	5
from 140 to 169	4
from 139 to the minimum number of points that a student must collect	3
Less than the minimum number of points that a student must collect	2

Points of ECTS scale not converted in 4-point scale and vice versa because the ECTS scale and 4-point scale are independent.

Objective evaluation of educational activities of students is tested by statistical methods (the correlation coefficient between ECTS score and score in a national scale).

### 13. Methodical support

Indicates methodical, didactic literature for to ensure discipline.

syllabus of the discipline

theses of lectures of the discipline

guidelines for teacher

training materials for self work of students

test and control tasks for workshops

questions and objectives for total control (examination)

### **List of educational materials**

1. Human anatomy in three volumes / A. S. Holovatskyi, V. G. Cherkasova, M. R. Sapin, Y. I. Fedonyuk. – Vinnytsia: New book, 2006, 2007, 2008.
2. Human anatomy. In two parts. / Ed. K. A. Dubenko. - K: JSC "Atlant-UMS", 2004. - 689 p.
3. Human anatomy. In three volumes / Ed. V. G. Koveshnikova. - Luhansk: Shiko Publishing House, LLC "Virtual Reality", 2005. - 328 p.
4. Anatomy of the human skeleton: based on the materials of the Lviv Anatomical Museum. Lviv: LNMU named after Danylo Halytskyi / V. B. Fick, M. N. Tsitovskiy, Yu. Ya. Kryvko, B. D. Kordys, L. R. Mateshuk-Vatseba, O. S. Fitkalo. - Lviv. - 2016. - 294 p.
5. Mateshuk-Vatseba L.R. Normal anatomy: educational and methodological guide / L.R. Mateshuk-Vatseba; Lviv National Medical University named after D. Halytskyi. – Lviv: Scientific Society named after Shevchenko; Vinnytsia: Nova Kniga, 2019. – 432 p.: illustrations.
6. Dubenko K. A. Anatomical terminology / K. A. Dubenko. - K.: Polygraph. Book, 2001. – 392 p. International anatomical nomenclature / Ed. I. I. Bobryka, V. H. Koveshnikova. - Kyiv: Zdrovya, 2001. - 328p.
7. International anatomical terminology (Latin, Ukrainian, Russian and English equivalents) / V. G. Cherkasov, I. I. Bobryk, Yu. J. Huminsky, O. I. Kovalchuk. – Vinnytsia: NovaKnyga, 2010. – 392 p.
8. Netlyukh M. A. Ukrainian-Latin anatomical dictionary / M. A. Netlyukh. - Lviv, 2000. - 215 p.
9. Netter F. G. Atlas of Human Anatomy = Atlas of human anatomy: translation of the 7th Eng. Edition: bilingual edition. / Frank G. Netter; of science Ed. Translated by L. R. Mateshuk-Vatseba, I. E. Gerasimiyuk, V. V. Kryvetskyi, O. G. Popadynets. - K. - VSV "Medicine", 2020. - 736 p.
10. Friedrich Paulsen. Sobotta. Atlas der Anatomie des Menschen / Friedrich Paulsen, Jens Waschke. – Munich: Urban & Fischer, 2011. – 416 S.
11. Netter, Frank G. / Atlas of human anatomy with Latin terminology: translation of the 7th Eng. kind. / Frank G. Netter; of science ed. Ukrainian ed.: L.R. Mateshuk-Vatseba, L.Yu. Smolska, D.Yu. Koval-Hnativ. - K.: VSV "Medicine", 2023. - 655p.

### **Additional**

1. Anatomical Museum of Lviv National Medical University named after Danylo Halytsky / B. S. Zimenkovskii, L. R. Mateshuk-Vatseba, U. E. Pidvalna, B. D. Kordys. - Lviv: Medicine of the world, 2020. - 136 p., illustrations.
2. Functional anatomy of cranial nerves / A. M. Zakruta, Yu. Ya. Kryvko, V. B. Fick, I. A. Tanchyn, M. P. Zakruta. - Lviv. - 2003. - 196 p.
3. Dubenko K. A. International anatomical nomenclature / K. A. Dubenko. - K.: Perun, 1997. - 143 p.
4. Fick V. B. Introduction to X-ray anatomy. X-ray anatomy of bones and their connections / V. B. Fick // Methodical development for student teachers. - Lviv, 2002. - 26 p.
5. Fiskova L.B. Methodological recommendations for independent work of students in the study of the motor apparatus. Part 1. Osteology. Kind. 2nd, revised, add. / L. B. Fiskova, L. R. Mateshuk-Vatseba. - LDMU, Lviv, 1998. - 64 p.
6. Rauber-Kopsch. Lehrbuch und atlas der anatomie des menshen / Rauber-Kopsch. – Bend I. Leipzig, 1940. – 500 S.

### **15. Information resources**

- 1) The testing center is a database of license test tasks Step – 1 <http://testcentr.org.ua/>
- 2) OMIM (Online Mendelian Inheritance in Man) – An Online Catalog of Human Genes and Genetic Disorders <http://omim.org/>
- 3) <https://new.meduniv.lviv.ua/kafedry/kafedra-normalnoyi-anatomiyi/>