AL-FARABI KAZAKH NATIONAL UNIVERSITY
Medicine and Health Care Faculty
Higher School of Medicine
Department of Fundamental Medicine
METHODICAL INSTRUCTIONS FOR PRACTICAL LESSONS
for the discipline OMiF1214 "Morphology and physiology of human body"
(11 credits)
Fall semester, academic year 2023-2024

Practical Lesson 1
Topic: Overview of the Nervous System. Properties of Neurons. Synapses. Neural Integration.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *describe the overall function of the nervous system; its major anatomical and functional subdivisions, three functional properties found in all neurons;.*
2. *define the three most basic functional categories of neurons, identify the parts of a neuron;*
3. *explain how neurons transport materials between the cell body and tips of the axon, how messages are transmitted from one neuron to another;*
4. *give examples of neurotransmitters and neuromodulators and describe their actions;*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 2
Topic: The Functions of Muscles, Muscle Attachments. Functional Groups of Muscles, Innervation and Blood Supply, Muscle Names and Learning Strategy
Numbers of hours - 2
Maximum mark - 2
Learning outcomes:

1. *describe five functions of muscle tissue;*
2. *relate the muscle bundles to the shape and relative strength of the muscles;*
3. *explain the disadvantages associated with the names of their attachments;*
4. *distinguish between internal and external muscles;*
5. *describe how the muscles work in groups to help, resist, and mitigate each other's actions.*
6. *describe in general terms the nerve and blood supply to the skeletal muscles;*
7. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 3
Topic: Biophysics 1. The Nerve-Muscle Relationship. Behavior of Skeletal Muscle Fibers
Numbers of hours - 1
Maximum mark – 1
Learning outcomes:

1. *list and define five characteristics of muscle contraction;*
2. *describe the structure is transversely striated muscle; the model of sliding threads;*
3. *determine the mechanical properties of bone tissue; strains of the muscle;*
4. *determine the effective elastic modulus; the cross section of the tendon.*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 4
Topic: Human Histology 1-2. Muscle tissue: smooth and striated skeletal muscle tissue. Nerve tissue. General features of Nerve tissue.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *list the three major muscle types and compare their structure, function, location*

2. *define the structure and functions of the Skeletal Muscle, the relationships among muscle fascicles, muscle fibers, myofibrils, myofilaments.*
3. *recognize Skeletal muscle in micrographs, conclude the functions of muscle tissue based on their histological feature.*
4. *identify components of the sarcomere on image.*
5. *Determine the structural components of neurocytes (neurofibromas, basophilic substances), myelin and non-myelinated nerve fibers under a microscope and microphotography.*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 5
Topic: Behavior of the whole Muscle. Muscle Metabolism
Numbers of hours - 2
Maximum mark - 2
Learning outcomes:

1. *Describe the stages of muscle twitching;*
2. *explain how successive muscle contractions can lead to stronger muscle contractions;*
3. *difference between isometric and isotonic, concentric and eccentric contraction*
4. *Explain how the skeletal muscle meets its energy needs during rest and exercise;*
5. *discuss why additional oxygen is needed even after the exercise is over;*
6. *explain the cause of muscle fatigue and soreness;*
7. *discuss the impact of resistance and endurance exercises on your muscles, the factors that affect muscle strength;*
8. *distinguish two physiological types of muscle fibers and explain their functional role*
9. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 6
Topic: Muscles of the head and neck
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *Describe the physiological properties that all types of muscles have;*
2. *name and determine the location of the muscles that produce facial expressions, the muscles used for chewing and swallowing; the muscles of the neck by which the head moves,*
3. *Determine the action of these muscles.*
4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 7
Topic: Muscles of the Anterior Abdominal Wall; Muscles of the Pelvic Floor; Muscles of the Back. Muscles of Respiration.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *Name and determine the location of the abdominal wall, back and pelvic floor muscles;*
2. *determine the action of these muscles*
3. *Explain how the breathing muscles affect air flow and abdominal pressure;*
4. *describe the the action of these muscles*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills.*

Practical lesson 8
Topic: Muscles Acting on the Hip and Femur,Muscles Acting on the Knee and Leg. Muscles Acting on the Foot, Intrinsic Muscles of the Foot
Numbers of hours - 2
Maximum mark – 2

Learning outcomes:

1. *Name and locate the muscles that act on the hip, knee joints, on the ankle and toes;*
2. *correlate the actions of these muscles with the movements of the joints,*
3. *describe the the action of these muscles*
4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills.*

Practical lesson 9

Topic: Muscles Acting on the Shoulder and Arm; Muscles Acting on the Forearm, the Wrist and Hand

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *Name and determine the location of the muscles that affect the pectoral girdle, shoulder, elbow, wrist, and arm,*
2. *relate the actions of these muscles to the joints;*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical Lesson 10

Topic: Overview of the Nervous System. Properties of Neurons. Neuroglia. Synapses. Neural Integration. Spinal cord.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe the overall function of the nervous system; its major anatomical and functional subdivisions, three functional properties found in all neurons;how memory works at the cellular and molecular levels.*
2. *explain how stimulation of a postsynaptic cell is stopped, how a neuron "decides" whether or not to generate action potentials; how the nervous system translates complex information into a simple code; how neurons work together in groups to process information and produce effective output;*
3. *state the three principal functions of the spinal cord; describe its gross and microscopic structure;*
4. *trace the pathways followed by nerve signals traveling up and down the spinal cord*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 11

Topic: Biophysics 4. Biophysics of the nervous system Electrophysiology of neuronal synapses. Biophysics of the neural integration of the nervous system

Numbers of hours - 1

Maximum mark – 1

Learning outcomes:

1. *list the conditions for the emergence of resting potentials and actions on the membrane; define Nernst formula and Goldman-Hodgkin-Katz equation;*
2. *determine of action potential; action potential phases; distribution of action potential along myelin and non-myelin nerve fibers;*
3. *describe the mechanisms of the methods for registering biopotential as EEG, ECG, EMG.*
4. *apply the appropriate formulas to calculate the value of the resting biopotential and action.*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 12

Topic: Somatic reflexes. Spinal Nerves

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *define reflex and explain how reflexes differ from other motor actions;*
2. *describe the general components of a typical reflex arc;*
3. *explain how the basic types of somatic reflexes function.*
4. *describe the anatomy of nerves and ganglia in general; the attachments of a spinal nerve to the spinal cord;*
5. *trace the branches of a spinal nerve distal to its attachments;*
6. *name the five plexuses of spinal nerves and describe their general anatomy; major nerves that arise from each plexus;*
7. *explain the relationship of dermatomes to the spinal nerves.*
8. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 13

Topic: Human Histology 12 Histology of the nervous system. Central nervous system. Brain. Cortex. Cerebellum. Overview of the meninges, ventricles, cerebrospinal fluid and blood supply.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *identify the layers of the cerebellar cortex, the layers of the cerebral cortex, interpret the cytoarchitecture of it*
2. *recognize the cerebellum in the specimens and slides, the cerebral cortex*
3. *explain the functional peculiarities of cerebellar cortex on the basis of cellular content and relationship with other organs of the nervous system, the differences between sensory and motor cortex.*
4. *describe the agranular and granular types of cerebral cortex, the blood – brain barrier in terms of its structural correlates and its function*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 14

Topic: Overview of the meninges, ventricles, cerebrospinal fluid and blood supply. Midbrain. Hindbrain. Forebrain.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe the major subdivisions and anatomical landmarks of the brain; the locations of its gray and white matter; the meninges of the brain; the fluid-filled chambers within the brain; the embryonic development of the CNS and relate this to adult brain anatomy*
2. *discuss the production, circulation, and function of the cerebrospinal fluid that fills these chambers;*
3. *explain the significance of the brain barrier system.*
4. *list the components of the hindbrain and midbrain and their functions;*
5. *describe the location and functions of the reticular formation, the three types of tracts in the cerebral white matter; the distinctive cell types and histological arrangement of the cerebral cortex; the location and functions of the basal nuclei and limbic system*
6. *name the three major components of the diencephalon and describe their locations and functions;*
7. *identify the five lobes of the cerebrum and their functions;*
8. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 15

Topic: Integrative functions of the brain

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *list the types of brain waves and discuss their relationship to mental states;*
2. *describe the stages of sleep, their relationship to the brain waves, and the neural mechanisms of sleep;*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 16

Topic: Human Histology 10-11 Histology of the supporting cells of the nerve tissue (neuroglia). Histology of the Nervous System Peripheral Nervous System. Ganglia. Spinal cord.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *name supporting cells of the nerve tissue*
2. *compare supporting cells of the nerve tissue in terms of their features, myelinated and unmyelinated nerve fibers in terms of their features*
3. *identify supporting cells in micrographs,the spinal cord and its horns in the specimen.*
4. *conclude the functions of neuroglial cells based on their histological features.*
5. *investigate the organs of the nervous system in the specimens according to key features of structure.*
6. *identify and classify the peripheral and central organs of the nervous system.*
7. *recognize the spinal ganglion in the specimens on the basis of key morphological features.*
8. *determine the general structure of the peripheral nerve.*
9. *Describe the functional significance of different nuclei.*
10. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 17

Topic: Integrative functions of the brain

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *identify the brain regions concerned with consciousness and thought, memory, emotion, sensation, motor control, and language;*
2. *discuss the functional differences between the right and left cerebral hemispheres.*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical Lesson 18

Topic: Cranial Nerves

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *list cranial nerves by name and number;*
2. *identify where each cranial nerve originates and terminates;*
3. *state the functions of each cranial nerve.*
4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*
5. *Demonstrate the knowledge of the anatomy and physiology of the central nervous system.*

Practical class 19

Topic: The nervous System -The Autonomic Nervous System. **General Properties of the Autonomic Nervous System**

Numbers of hours - 2

Maximum mark – 2

1. *Explain how the autonomic and somatic nervous systems differ in form and function;*
2. *Explain how the two divisions of the autonomic nervous system differ in general function.*

3. *Identify the anatomical components and nerve pathways of the sympathetic and parasympathetic divisions in the picture;*
4. *Discuss the relationship of the adrenal glands to the sympathetic nervous system;*
5. *Describe the enteric nervous system of the digestive tract and explain its significance;*

Practical class 20

Topic: The nervous System -The Autonomic Nervous System II

Anatomy of the Autonomic Nervous System Autonomic Effects on Target Organs Central Control of Autonomic Function

Numbers of hours - 2

Maximum mark – 2

1. *Name the neurotransmitters employed at different synapses of the ANS;*
2. *Name the receptors for these neurotransmitters and explain how they relate to autonomic effects;*
3. *Explain how the ANS controls many target organs through dual innervation;*
4. *Explain how control is exerted in the absence of dual innervation.*
5. *Describe how the autonomic nervous system is influenced by the central nervous system*

Practical class 21

Topic: Histology of the nervous System -Histology The Sensory Organs. Organs of hearing and balance, taste.

Numbers of hours - 2

Maximum mark – 2

1. *Describe the microscopic anatomy of the ear,*
2. *Describe the microscopic anatomy of the organ of taste.*

Practical class 22

Topic:The nervous System -Properties and Types of Sensory Receptor. The General Senses; The Chemical Senses—Taste and Smell

Numbers of hours - 2

Maximum mark – 2

1. *Define receptor and sense organ;*
2. *List the four kinds of information obtained from sensory receptors,*
3. *Describe how the nervous system encodes each type;*
4. *Outline three ways of classifying receptors.*
5. *List several types of somatosensory receptors;*
6. *Describe the projection pathways for the general senses;*
7. *Explain the mechanisms of pain and the spinal blocking of pain signals.*
8. *Describe the receptor cells for taste and smell and identify their anatomical locations;*
9. *Identify the five primary taste sensations and the chemicals that produce them;*
10. *Discuss factors other than taste that contribute to the flavor of food;*
11. *Identify the brain regions that process gustatory and olfactory information.*

Practical class 24

Topic: Eye and Vision

Numbers of hours - 2

Maximum mark – 2

1. *Describe and identify the anatomy of the eye and its accessory structures in the picture and in the model;*
2. *Discuss the structure of the retina and its receptor cells;*
3. *Explain how the optical system of the eye creates an image on the retina;*
4. *Discuss how the retina converts this image to nerve signals;*
5. *Explain why different types of receptor cells and neural circuits are required for day and night vision;*
6. *Describe the mechanism of color vision; and trace the visual projection pathways in the brain.*

Practical class 24

Topic: Histology The Sensory Organs Organ of sight, organ of smell.

Numbers of hours - 2

Maximum mark – 2

1. *Describe the microscopic anatomy of the the eye,*
2. *Describe the microscopic anatomy of the organ of smell.*

Practical class 25

Topic:The laws of geometric optics. Eye as an optical system

Numbers of hours - 2

Maximum mark – 2

Practical class 26

Topic: Hearing and Equilibrium

Numbers of hours - 2

Maximum mark – 2

1. *Identify the properties of sound waves that account for pitch and loudness;*
2. *Describe the gross and microscopic anatomy of the ear;*
3. *Identify and find the structure of the ears in the model;*
4. *Explain how the ear converts vibrations to nerve signals and discriminates between sounds of different intensity and pitch;*
5. *Explain how the vestibular apparatus enables the brain to interpret the body's position and movements;*
6. *Describe the pathways taken by auditory and vestibular signals to the brain.*

Practical lesson 27

Topic: Introduction, Blood Types. Erythrocytes.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe the functions and main components of the circulatory system; the components and physical properties of blood;*
2. *explain what determines the ABO and Rh of human blood and how this is related to compatibility with blood transfusions;*
3. *describe the consequences of incompatibility of the blood group between the mother and the fetus, the structure and function of red blood cells; hemoglobin*
4. *determine clinical measurements of the number of red blood cells and hemoglobin; describe the life history of red blood cells;*
5. *name and describe the types, causes and consequences of excessive and insufficient number of red blood cells*

Practical lesson 28

Topic: Human Histology 3-4. Hemopoiesis. General features of Hematopoiesis. Blood. Formed elements: Erythrocytes, leukocytes, platelets

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe the structural and functional characteristics of a stem cell.*
2. *compare mature circulating blood cells and hematopoietic stem cells.*
3. *define the sites and the phases of intrauterine hematopoiesis, blood cells life span and site of postnatal hematopoiesis.*
4. *recognize differences in the blood cells produced during each stage of postnatal hematopoiesis.*
5. *describe general features of bone marrow.*
6. *conclude the functions of blood cells based on their histological features*

Practical lesson 29

Topic: Leukocytes. Interpretation of blood tests.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *explain the function of white blood cells in General and the individual role of each type of white blood cell;*
2. *describe the appearance and relative prevalence of each type of white blood cell; the formation and life history of white blood cells;*
3. *interpret the changes in blood system parameters*
4. *discuss the types, causes, and consequences of excessive and insufficient white blood cell counts*

Practical lesson 30

Topic: Platelets and Hemostasis, The Control of Bleeding. Coagulogram. Changes in blood system parameters.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe the mechanisms for controlling bleeding in the body; blood clotting disorders*
2. *list the functions of platelets;*
3. *describe the two reaction pathways that cause blood clots to form,*
4. *explain what happens to blood clots when they are no longer needed; what keeps the blood from clotting in the absence of injury,*
5. *Explain the stages of platelet formation*
6. *interpret the changes in blood system parameters*
7. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
8. *Demonstrate knowledge of the normal anatomy and physiology of the muscular and blood systems (including histology)*

Practical lesson 31

Topic: Human Histology 5-6. Cardiovascular system. General features of the CVS. Blood vessels. Arteries and veins. Microcirculation stream. Arterioles. Capillaries. Venules.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *name the 3 tunics that make up the walls of cardiovascular system components.*
2. *describe the tissue type in each tunic in the wall of blood vessels.*
3. *recognize the blood vessel types in a micrograph and identify their structural components.*
4. *conclude the functions of blood vessels based on their histological feature, explain the role in conduction of blood and distribution of nutrients.*
5. *recognize the artery and vein types in a micrograph and identify their structural components of their wall, describe function of each layer.*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 32

Topic: Overview of the Cardiovascular System. Gross Anatomy of the heart

Numbers of hours - 1

Maximum mark – 2

Learning outcomes:

1. *identify and distinguish the pulmonary contour and the systemic contour;the four chambers of the heart and correlate them with its internal and surface anatomy; the four valves of the heart;*
2. *describe the general location, size, and shape of the heart;the pericardial sac that covers the heart. the three layers of the heart wall;*
3. *trace the blood flow through the four chambers and valves of the heart and adjacent blood vessels;*

4. *describe the arteries that feed the myocardium and the veins that deplete it*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 33
Topic: Cardiac Muscle and the Cardiac Conduction System.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *describe the unique structural and metabolic characteristics of cardiac muscle; the heart's pacemaker and internal electrical conduction system; the nerve supply to the heart and explain its role, how changes in blood pressure operate the heart valves;*
2. *explain the nature and functional significance of the intercellular junctions between cardiac muscle cells; why blood pressure is expressed in millimeters of mercury; what causes the sounds of the heartbeat;*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 34
Topic: Biophysics 2. Electrical and Contractile Activity of the Heart. Electrocardiogram.
Numbers of hours - 1
Maximum mark – 1
Learning outcomes:

1. *determine the mechanisms ECG registration;*
2. *define an electric dipole;*
3. *explain Einthoven's theory; the main provisions of the theory of Einthoven; the occurrence of ECG waves;*
4. *determine the position of the electrical axis of the heart according to the results of the ECG;*
5. *calculate heart rate and give a conclusion.*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 35
Topic: Blood flow, heart sounds and cardiac cycle. Cardiac Output.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *describe in detail one complete cycle of heart contraction and relaxation;*
2. *relate the events of the cardiac cycle to the volume of blood entering and leaving the heart*
3. *Define cardiac output and explain its importance;*
4. *determine the factors that affect cardiac output*
5. *discuss the nerve and chemical factors that change heart rate, stroke volume, and cardiac output.*
6. *Explain how the right and left ventricles achieve balanced functioning;*
7. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 36
Topic: General Anatomy of the Blood Vessels
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *describe some of the effects of exercise on heart output, the structure of a blood vessel; the types of arteries, capillaries, and veins;*
2. *trace the general route usually taken by the blood from the heart and back again;*
3. *describe variations on this route.*

4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 37

Topic: Human Histology 7. Cardiovascular system. Cardiac Muscle muscle tissue. Heart. Layers of the Heart Wall. Current control 1.

Numbers of hours -2

Maximum mark –2

Learning outcomes:

1. *recognize the microcirculatory blood vessel types in a micrograph and identify their structural components.*
2. *recognize the arterioles, venules types in a micrograph and identify their structural components of their wall, describe function of each layer in micrographs.*
3. *identify blood capillaries types in micrographs and compare them in terms of their features.*
4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*
5. *Demonstrate knowledge of the histology of the muscular and circulatory systems*

Practical lesson 38

Topic: Capillary Exchange. Regulation of blood pressure and flow.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *describe how materials get from the blood into the surrounding tissues; the causes and effects of edema, local, neural, and hormonal influences on the blood pressure*
2. *describe and calculate the forces that enable capillaries to give off and reabsorb fluid;*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 39

Topic: Venous Return and Circulatory Shock. Special Circulatory Routes. Anatomy of the Pulmonary Circuit.

Numbers of hours - 2

Maximum mark – 2

Learning outcomes:

1. *Explain how the blood in the veins returns to the heart;*
2. *discuss the importance of physical activity for venous return;causes of circulatory shock;the causes and effects of strokes and transient ischemic attacks;*
3. *name and describe the stages of shock*
4. *explain how the brain maintains stable perfusion; the mechanisms that increase muscular perfusion during exercise; why the difference is important in pulmonary function.*
5. *contrast the blood pressure of the pulmonary circuit with that of the systemic circuit,*
6. *trace the route of blood through the pulmonary circuit*
7. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 40

Topic: Biophysics 3. Blood pressure, resistance and flow

Numbers of hours - 1

Maximum mark – 1

Learning outcomes:

1. *define the blood speeds in different parts of the system, viscosity values, blood pressure on the walls of the vessel; conditions for the transition of the laminar flow to a turbulent;*
2. *describe the mechanism of the pulse wave and its propagation velocity, volumetric blood flow velocity; physical meaning of the Reynolds number;*
3. *calculate the pressure, flow and viscosity of liquids using hydrodynamic laws and formulas.*

4. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 41-42
Topic: Systemic Vessels of the Axial Region
Numbers of hours - 2+2
Maximum mark – 2+2
Learning outcomes:

1. *identify the principal systemic arteries and veins of the axial region;*
2. *trace the flow of blood from the heart to any major organ of the axial region and back to the heart.*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 43
Topic: Human Histology 8-9. Lymphoid system. General features of the Lymphoid system. Thymus. Lymphoid system. Lymph Nodes. Spleen.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *define the organs of the lymphoid system, distinguish between central and peripheral lymphoid organs, main structural features of the lymphoid system organs, main structural features of the peripheral lymphoid organs.*
2. *identify the organs of the lymphoid system, their components in micrographs, the thymus in micrographs, distinguish cortex and medulla, Hassall's corpuscle, the spleen in micrographs, distinguish white and red pulp, the lymph nodes in micrographs, distinguish cortex and medulla*
3. *describe the blood – thymus barrier in terms of its structural correlates and its function*
4. *define and identify the peripheral lymphoid organs, their components in micrographs.*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 44
Topic: Anatomy of the Systemic Vessels of the Appendicular Region
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *identify the principal systemic arteries and veins of the limbs;*
2. *trace the flow of blood from the heart to any region of the upper or lower limb and back to the heart.*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

Practical lesson 45
Topic: The lymphatic and immune system.
Numbers of hours - 2
Maximum mark – 2
Learning outcomes:

1. *list the functions of the lymphatic system;*
2. *explain how lymph forms and returns to the bloodstream;*
3. *name the major cells of the lymphatic system and state their functions;*
4. *name and describe the types of lymphatic tissue;*
5. *describe the structure and function of the red bone marrow, thymus, lymph nodes, tonsils, and spleen.*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills*

METHODICAL INSTRUCTIONS FOR THE PRACTICAL LESSONS

Aim of the discipline is to form an integrated knowledge of the normal typical structure and functioning of cells and organs of the human body, taking into account age, gender and individual characteristics, anatomical and physiological relationships and regulation of the functions of cells, organs and systems in the normal, to develop skills of problem solving, independent learning and teamwork.

Learning outcomes:

1. identify and describe the structural and organizational structure of internal organs, correctly using the appropriate terminology, on models, preparations and materials of medical visualization, the typical structure of internal organs and systems of human organs (musculoskeletal system and skin, respiratory, circulatory systems) in the norm, taking into account age, gender and individual characteristics;
2. explain the functional organization of the human body at the cellular, systemic and organ levels, the physiological processes of excitable tissues;
3. identify the microscopic structure of human organs with regard to age, gender, and individual characteristics using appropriate terminology;
4. describe, using appropriate terminology, the stages of human development and explain the main processes and mechanisms of normal morphogenesis;
5. explain the relationship of structure and function at the level of tissue, organs and organ systems and the main physiological mechanisms for maintaining homeostasis, vital activity of the body and their features, taking into account age, gender and individual differences;
6. systematize knowledge about the structure of the musculoskeletal system, skin, respiratory and circulatory systems at the systemic, organ and tissue levels and their phylogenetic development and their role in understanding anatomical and physiological features in different periods of normal development;
7. recognize the importance and adhere to ethical principles, demonstrate responsibility and integrity in all learning interactions;
8. demonstrate an understanding of the importance and make efforts to develop the skills of scientific approach, continuous independent learning and improvement;
9. demonstrate an understanding of the importance and make efforts to develop teamwork skills.

Work plan:

1. Read the basic and additional literature, use textbooks, syllabus and these instructions, and online resources to prepare for practical classes.
2. Prepare for classes and actively participate in group discussions and discussion of problems/cases.
3. Use examples (including previously reviewed cases, your own experience) to illustrate the theoretical material.
4. Use various tools to explore, discuss, and visualize thoughts - drawing, mind maps, and 3d modeling
5. Use group case work to develop teamwork, communication, problem solving, and self-study skills.

Response quality scale (written/oral response)

Mark	**Criteria**	**Scale, points**
Excellent	1. all key aspects are included and presented logically; 2. high accuracy (relevance, without redundancy) and constant attention to the issue; 3. excellent integration of theoretical questions; 4. providing relevant examples; 5. in-depth analysis and theoretical justification of the problem (if applicable), all key aspects identified and interpreted; 6. fluency in professional terminology	90 - 100

Good	1. all key aspects are included and presented logically; 2. constant focus on the issue with satisfactory accuracy, relevance, and / or some redundancy; 3. satisfactory integration of theoretical questions; 4. the lack of examples; 5. satisfactory analysis and theoretical justification of the problem (if applicable), most of the key aspects identified and interpreted; 6. correct use of professional terminology	70 - 89
Satisfactory	1. most of the key aspects are included; 2. satisfactory focus on the question - some errors and / or noticeable redundancy; 3. theoretical problems presented without noticeable integration; 4. Providing failed examples or no examples; 5. some analysis and theoretical justification of this problem (if applicable), most of the key aspects are defined and interpreted; 6. correct use of professional terminology	50 - 69
Unsatisfactory (FX)	1. most of the key aspects are omitted; 2. lack of attention to the issue-irrelevant and significant redundancy; 3. some theoretical problems presented without integration and understanding; 4. missing or outdated examples; 5. some analysis and theoretical justification of this problem (if applicable), most of the key aspects are omitted; 6. problems in using professional terminology	25 - 49
Unsatisfactory (F)	1. most or all of the key aspects are omitted; 2. no focus on the question, not much related to the issue of information; 3. significant gaps in theoretical questions, or their superficial consideration; 4. the lack of examples or irrelevant examples; 5. there is no analysis and no theoretical justification for the given problem (if applicable), most of the key aspects are omitted; 6. problems in using professional terminology	0-24

METHODICAL INSTRUCTIONS FOR THE TEAMWORK

The medical profession involves working in multidisciplinary teams, so these skills are identified as key in the competence of the doctor and other health professionals in all countries.

Therefore, group work is included as a mandatory component in the practical classes of our course. In addition, it is designed to provide a safe environment in which you can try out new ideas and practices and acquire appropriate group skills. These can be tasks to perform in pairs, threes, or small groups of 4-6 people (working with cases, tasks of the IWS, etc.).

When you are working on a project or task as a team, you can use the different strengths of the team members to create a broader and better project or task than if you were working on your own.

Learning in groups means that you need to share your knowledge and ideas with other students. There are two benefits to this: you need to think carefully about your own ideas in order to explain them to others, and you expand your own understanding by taking into account the knowledge and ideas of others.

Interpersonal communication and discussion

Take some time to chat and get to know each of your bandmates. The more familiar you are with each other and the more comfortable you are with each other, the more effective you will be able

to work together.

Create a culture of mutual respect in your group. You probably had little or no choice when forming study groups and small teams in the classroom. Therefore, you will have to learn to overcome the differences that occur between people. In addition, you will not be able to choose employees in the workplace, and at work you will experience significantly more pressure to be a productive member of the team.

For effective communication and discussion in the team: you should not hesitate to Express their opinions and it is important to feel that those views will be heard; it is important to feel that all group members are contributing to the solution of tasks adhere to agreed rules and plans and doing the work qualitatively and in time; it is important to know that the feelings of each are considered members of the team, but the goals and objectives of the group are not put at risk in favor of the whims or desires of individual members;

Try to Express your opinion and listen to others. There is nothing wrong with disagreeing with your classmates, no matter how confident they are in what they are saying. When you disagree, be constructive and focus on the problem, not the person. Similarly, when someone disagrees with you, respect what they say and the risk they took in expressing their opinion. Try to find a way that everyone can agree on, and it's not necessarily the opinion of the loudest or smartest team member.

Here are some examples of constructive and destructive group behavior

Constructive group behavior - a person who:
What unites *us is an interest in the views and opinions of others and a willingness to adapt to the interests of others*
Clarifies*-clearly identifies issues for the group by listening, summarizing, and focusing the discussion*
Inspires*-encourages the group, encourages participation and progress*
Harmonizes*-encourages group unity and teamwork. For example, it uses humor as a release after difficult situations.*
Takes a risk*-a willingness to take risks to the detriment of yourself for the success of a group or project*
Manages the process-organizes *a group on process issues: for example, a plan, schedule, timeline, topic, solution methods, and information usage*

Destructive group behavior:
Dominance*-takes a lot of time expressing your opinions and views. Tries to take control by capturing energy, time, and so on*
Fussiness*-hurries the group to move quickly before the task is completed. Impatient to listen to other opinions and work together.*
Suspension*-removes itself from the discussion or decision-making. Opt-out*
Ignoring*-does not respect or belittle the ideas and suggestions of the team or individuals. The extreme manifestation of ignoring is an insult in the form of ridicule.*
Distraction *– excessive chatter, tells stories and leads groups away from the goal*
Blocking *– stopping the progress of the group by rejecting all ideas and suggestions. "It won't work because…»*

Effective group work does not occur by itself. A conscious and planned effort is needed, and since there are many people involved, you can't rely on memory; you have to make notes. **Following these steps** will help you and your group work together effectively.

1. Define clear goals. At each stage, you should try to coordinate the tasks. They include a schedule for completing the project, as well as more specific tasks (such as “agree on an approach to completing the task by Friday”). Each meeting or discussion should also start with a specific goal (for example, making a list of tasks to complete). Tasks should be divided into smaller parts and scheduled. Sometimes one part can't be started until the other part is finished, so you may need to draw a simple temporary map.

* discuss the resources you have and the ones you will need to find.
* formulate the desired result.
* think about how you will know when you have done it well enough?
* divide tasks between the team and
* set deadlines for sub-tasks and times for future meetings.

2. Set the basic rules. Discussions can become messy and can prevent more modest group members from participating if you don't have rules to encourage discussion, resolve differences, and make a decision without repetition. Set the rules from the beginning and change them as necessary. For example: an interesting rule that one group developed is that anyone who missed a meeting will buy the rest of the group coffee at a coffee shop. No one ever missed a meeting after that.

3. Communicate effectively. Make sure that you communicate regularly with the group members. Try to be clear and positive in what you say without repeating yourself.

4. Find a consensus. People work together most effectively when they are working towards a goal they have agreed to. Make sure everyone has their own opinion, even if you need time to get more participants to say something. Make sure you listen to everyone's ideas and then try to come to an agreement that everyone shares and everyone has contributed.

5. Define roles. Divide the work that needs to be done into separate tasks that you can use the strengths of individual team members to accomplish. Define roles for both your tasks and meetings / discussions (for example, Arani is responsible for summarizing the discussions, Joseph is responsible for everyone's opinions and decisions, and so on).

Examples of assigning roles and functions:

Facilitator or leader (depending on the context) - to clarify the goals of the meeting and to summarize the discussions and decisions; ensures that the meeting takes place, continues, and the basic rules are followed.

Secretary-keep a record of ideas discussed and decisions made, and who does what.

Time Manager - to make sure that you discuss everything you need in the allotted time for the meeting.

Controller-make sure that the work is completed by the agreed time, and solve problems if they are not completed.

A process observer is someone who monitors the process, not the content, and can bring issues to the attention of the team. In this role, it is important to be positive, not judgmental.

The editor is to bring all the materials together, to identify gaps or overlap and to ensure consistency in the final presentation.

6. Clarify. When a decision is made, it should be explained in such a way that it is absolutely clear to everyone what was decided, including the timing.

7. Keep good records. Always summarize your discussions and document your decisions and publish them (for example, in a whatsapp chat) so that you can always return to them. This includes lists of those who agreed to do what.

8. Stick to the plan. If you agreed to do something as part of the plan, do it. Your group relies on you to do what you agreed to do and in the way you agreed to do it, not in the way you would like to do it. If you think the plan should be revised, discuss it.

9. Keep track of progress and adhere to deadlines. Discuss the progress together in relation to your schedule and deadlines. Make sure that you personally meet the deadlines so that you don't let your group down.

Co-writing a document / report

Joint writing is one of the most difficult parts of group work. There are many ways to do this, and your group must decide how to divide the work of writing, composing, editing, and finalizing your work. Writing as a group (six people huddle around the keyboard) is a recipe for conflict and lack of progress. The other extreme - where one person takes all the responsibility and ends up doing most of the work - is also unproductive and contributes to conflicts.

There are three possible approaches to working on a common document:

1-one person writes most of it-this means that a narrow range of ideas is used, and the rest of the team does not learn (and will not learn) to write reports and documents.

2-each person writes one section - then it is difficult to make a single consistent report, and you will not learn about the rest except your own section.

3-co-writing. This is the most productive way to solve group tasks and provides the greatest benefit from working together. For example: each section has a writer and at least one reviewer, and each team member is the author of a section and the reviewer of another section.

The final product must be reviewed by all team members before being finalized by the editor. Alternatively, you can have one author with others editing, adding, and checking, and someone else puts the finished report in order.

Try to divide the writing of source documents into tasks and solve them individually or in pairs. After the first drafts of the sections are written, send out all the components and read them. You will probably need to get together to discuss how to combine them so that they fit together. Any participants who were not involved in preparing the drafts can do some of this work. Then edit, improve, and Polish the draft. It is convenient to work together on documents in Google documents.

When preparing a report/final document, regularly check the following:

- is the project goal clear from the report?
- are the Conclusions or recommendations clear?
- do the conclusions follow from the main part of the report?
- do the sections fit together well?
- does the report meet the goals (and evaluation criteria)?
- are the necessary components sufficiently covered?

Whatever method you use, all team members should agree on the process and how they are going to maximize the collaborative approach to writing the final document.

Monitoring the effectiveness of the group and overcoming challenges

Attached below is a checklist that includes a list of common problems encountered in group work. Use it regularly to identify problems before they get out of control. If there are serious problems and tensions, use it to identify where something might go wrong. First answer each question about yourself, then answer it about the group as a whole. Then gather a group and discuss where you think problems might occur, and think about how you can overcome these problems.

Each participant must complete this checklist. You should perform this exercise regularly to track and improve the performance of your team.

1. Answer each question about your work in the team.
2. Answer each question about the rest of the team.
3. Gather your entire team and discuss where you think any problems are occurring.
4. Discuss what you are going to do to overcome these problems.

Checklist for self-assessment of the team's performance.

You	I personally	Group as a whole	Comments
Effectively clarify your tasks and tasks at each stage?			
Evaluating the progress of work?			

We clarify and document everything that the group has decided?			
We clarify who will do what and how?			
Making it clear by what date each task should be completed?			
Setting up rules for managing meetings?			
Follow the agreed rules?			
Listening to each other?			
Let some team members dominate?			
Allow some team members to refuse/recuse themselves?			
Sacrificing personal desires for the team's success?			
Recognize the feelings of other team members?			
Making an equal contribution to the team's progress?			
We adhere to the agreed rules for writing and naming files?			

Points and rating

Group tasks and tasks mean that grades are assigned to the entire group based on the results of the entire group. It should be in everyone's interest to ensure the effective contribution of all team members and to ensure the high quality of the task performed. Sometimes a peer-to-peer or peer-to-peer evaluation form and a team-work evaluation form will be used to evaluate the relative contribution of each person to the group process. This can be used to soften ratings for a task, or just as a way to give feedback about your work in the group. The following are examples of criteria for evaluation of student team learning.

№	**Student evaluation criteria in practical classes**
1	*Preparing for classes:* Examines information focused on the case and issues of concern, uses various sources, and supports claims with appropriate links
2	*Group skills and professional attitude:* Demonstrates excellent attendance, reliability, and responsibility Takes the initiative, actively participates in the discussion, helps group members, willingly takes tasks
3	*Communication skills:* Actively listens, shows emotions according to the situation, is receptive to non-verbal and emotional signals, shows respect and correctness towards others, helps resolve misunderstandings and conflicts
4	*Skills for providing feedback:* Demonstrates a high level of self-analysis, critically evaluates himself and colleagues, provides constructive and objective feedback in a friendly manner, and accepts feedback without opposition

5	*Critical thinking and effective learning skills:* Effectively participates in generating hypotheses and formulating problematic questions, provides relevant examples from life, skillfully applies knowledge to the problem/case under consideration, critically evaluates information, makes conclusions, explains and justifies statements, draws diagrams and drawings, demonstrates constant interest in the material being studied
6	*Theoretical knowledge and skills on the topic of the lesson:* All key aspects are presented logically; accuracy, relevance of answers to questions without redundancy; integration of theoretical questions; use of relevant examples; correct use of professional terminology

Basic literature:

1. Saladin, Kenneth S: Anatomy & Physiology. The Unity of Form and Function, 9th Edition (2020, McGraw-Hill Education), ISBN-10 1260571297, 978-1260571295
2. Costanzo, Linda S.: BRS Physiology. Board Review Series.7 edition. -Wolters Kluwer Health, 2018.- 307p. - ISBN 1496367693, 9781496367693
3. Leslie P. Gartner: Color Atlas and Text of Histology. - 7th Edition. - Wolters Kluwer, 2017. ISBN 1496346734, 9781496346735
4. Russell K. Hobbie, Bradley J. Roth: Intermediate Physics for Medicine and Biology. - Springer, 2015. - ISBN 3319126822, 9783319126821
5. Andersson D, Medical Terminology: The Best and Most Effective Way to Memorize, Pronounce and Understand Medical Terms: Second Edition, ISBN-13 : 978-1519066626, 2016
6. Shoibekova, Alima Zhorabaevna. Latin and Fundamentals of Medical Terminology for Medical Students with Training English [Text] : educational man. / A. Zh. Shoibekova, 2016. - 163, [1] p.
7. Sembulingam, K. Essentials of Medical Physiology [Text] : [monogr.] / K. Sembulingam, P. Sembulingam ; Madha Medical College [et al.]. - 7th ed. - New Delhi ; London ; Philadelphia : Jaypee, 2016. - 1112 p. : il. - Ind.: p. 1069-1112. - ISBN 978-93-85999-11-6

Additional literature:

8. Standring, Susan: Gray's Anatomy: The Anatomical Basis of Clinical Practice. - 41 Elsevier Limited, 2016
9. Elaine N. Marieb, Lori A. Smith: Human Anatomy & Physiology Laboratory Manual, Main Version. - 11 edition. - Pearson Education,2015. - ISBN 9780133999143
10. Scanlon V. C, Essentials of Anatomy and Physiology 8th Edition, F.A. Davis Company, 2018
11. Victor P. Eroschenko, Atlas of Histology with Functional Correlations 13th Edition, LWW, 2017
12. William Bialek: Biophysics: Searching for Principles. -Princeton University Press, 2012. - ISBN 0691138915, 9780691138916
13. Ghosh, Byas Deb. Human Anatomy [Text] : For Students / B. D. Ghosh ; [Anatomical Society of India (West Bengal Chapter) et al.]. - 2nd ed. - New Delhi ; Panama City ; London : Jaypee, 2013. - 948 p. : il. - Ind.: p. 913-948. - ISBN 978-93-5025-942-9
14. Mazumdar, Sibani. Anatomy at a Glance [Text] : An Exam-Oriented Text / S. Mazumdar ; Calcutta National Medical College [et al.]. - 2nd ed. - New Delhi ; London ; Philadelphia : Jaypee, 2014. - 534 p. : il. - Ind.: p. 525-534. - ISBN 978-93-5152-355-0 : App.: p. 519-520. Glossary: p. 521-524.
15. Baktybayeva, Lyaila Kyrgyzbayevna. Base of Physiology [Text] : laboratory practicum / L. K. Baktybayeva, G. T. Zhamanbayeva, M. S. Kulbayeva ; Al-Farabi Kazakh National University. - Almaty : Qazaq University, 2017. - 146 p. : il. - Bibliogr.: p. 145. - ISBN 978-601-04-3138-6

Online resources:

1. https://app.lecturio.com/#/
2. https://3d4medical.com/
3. https://www.youtube.com/channel/UCc_I2c2bUtO0p4DVeo6-Kxg
4. https://sites.google.com/a/umich.edu/bluelink/curricula/anatomy-403?authuser=0
5. https://histologyknmu.wixsite.com/info/gistologicheskie-sajty
6. http://www.histology-world.com/contents/contents.htm
7. http://www.histologyguide.com/slidebox/02-epithelium.html
8. https://histology.medicine.umich.edu/resources
9. https://web.duke.edu/histology/
10. http://virtualslides.med.umich.edu/Histology/view.apml?listview=1&