AL-FARABI KAZAKH NATIONAL UNIVERSITY

Medicine and Health Care Faculty
Higher School of Medicine
Department of Fundamental Medicine

METHODOLOGICAL INSTRUCTIONS FOR PRACTICAL LESSON

in the discipline OMiF1214 "Morphology and physiology of human body"

(8 credits)

Practical lesson 1

The Muscular system 1: The Functions of Muscles, Muscle Attachments
Functional Groups of Muscles, Innervation and Blood Supply,Muscle Names and Learning Strategy

Maximum mark - 4

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

Practical lesson 2

The Muscular system 2: Behavior of a whole muscle

Maximum mark – 4

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 reduction;
4. distinguish between concentric and eccentric contraction
5. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 3

Biophysics 1-2
The Nerve-Muscle Relationship
Behavior of Skeletal Muscle Fibers

Maximum mark - 4

1. explain what a motor unit is and how it is related to muscle contraction;
2. describe the structure of the joint where the nerve fiber meets the muscle fiber;
3. explain why the cell has a difference in electrical charges on its plasma membrane and, in General, how this is related to muscle contraction;
4. Describe how the nerve fiber stimulates skeletal muscle fibers
5. draw a schematic diagram of how stimulation of a muscle fiber activates its contractile mechanism;
6. explain the mechanism of muscle contraction;

7. describe how the muscle fiber relaxes;
8. explain why the strength of muscle contraction depends on the length of the muscles before stimulation
9. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 4
The Muscular system 3: Muscle Metabolism
Maximum mark – 4

1. Explain how the skeletal muscle meets its energy needs during rest and exercise;
2. discuss why additional oxygen is needed even after the exercise is over;
3. explain the cause of muscle fatigue and soreness;
4. discuss the impact of resistance and endurance exercises on your muscles,
5. discuss the factors that affect muscle strength;
6. distinguish two physiological types of muscle fibers and explain their functional role
7. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 5
The muscular system 4-5
Muscles of the Anterior Abdominal Wall; Muscles of the Pelvic Floor; Muscles of the Back. Muscles of Respiration
Maximum mark – 4

1. Name and determine the location of the abdominal wall, back and pelvic floor muscles;
2. determine the location of their attachment to the bones, the action and innervation of these muscles
3. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
4. name and determine the location of the back muscles;
5. determine the location of attachment, action, and innervation of these muscles.
6. Name and locate the breathing muscles
7. Explain how they affect air flow and abdominal pressure;
8. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 6
Human tissue 1-2
Microscopic Anatomy of Skeletal Muscle. Connective tissue of Skeletal muscle. Nerve tissue
Maximum mark – 4

1. Describe the structural components of the muscle fiber;
2. correlate the banding of the muscle fiber with the parallel location of its protein strands;
3. name the main muscle fiber proteins and specify the function of each.
4. Describe the structural differences between cardiac and skeletal muscle.
5. Identify structural features of smooth and striated muscle tissue under a microscope and microphotographs:
6. Describe the structural features of the fibers of the striated muscle, heart muscle tissue, the mechanism of contraction of the striated muscle.
7. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

8. Determine the structural components of neurocytes (neurofibromas, basophilic substances), myelin and non-myelinated nerve fibers under a microscope and microphotography.
9. Describe the classification and structural features of neurocytes.
10. Describe the classification of glial cells.
11. Tell us about the functional importance of glial cells.
12. Describe the structural features of myelin and non-myelinated nerve fibers.
13. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 7
The muscular system 6
Muscles of the head and neck
Maximum mark – 4

1. Describe the physiological properties that all types of muscles have;
2. name and determine the location of the muscles that produce facial expressions;
3. name and determine the location of the muscles used for chewing and swallowing;
4. name and locate the muscles of the neck by which the head moves,
5. Determine the attachment points, action, and innervation of these muscles.
6. Explain how Latin names of muscles help you visualize and remember them
7. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 8
The muscular system 7
Muscles Acting on the Shoulder and Arm;
Muscles Acting on the Forearm, the Wrist and Hand
Maximum mark – 4

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

Practical lesson 9
The muscular system 8
Muscles Acting on the Hip and Femur,Muscles Acting on the Knee and Leg. Muscles Acting on the Foot, Intrinsic Muscles of the Foot
Maximum mark – 4

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

8. describe the structural differences between smooth muscle and skeletal muscle
9. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 10
Current control 1 «Muscular system**»**
Maximum mark – 54

Demonstrate knowledge of the normal anatomy and physiology of the muscular system (including histology)

Practical lesson 11
Blood
Maximum mark – 4
Demonstrate knowledge of the normal anatomy and physiology of the Blood)
Introduction, Blood Types. Erythrocytes. Leukocytes. Platelets and Hemostasis, The Control of Bleeding

1. *describe the functions and main components of the circulatory system;*
2. *describe the components and physical properties of blood;*
3. *describe the composition of blood plasma; explain the value of blood viscosity and osmolarity;*
4. *describe in General terms how blood is produced;*
5. *explain what determines the ABO and Rh of human blood and how this is related to compatibility with blood transfusions;*
6. *list some blood groups other than ABO and Rh,*
7. *Explain how they can be useful;*
8. *describe the consequences of incompatibility of the blood group between the mother and the fetus.*
9. *Describe the structure and function of red blood cells;*
10. *describe the structure and function of hemoglobin.*
11. *determine some clinical measurements of the number of red blood cells and hemoglobin; describe the life history of red blood cells;*
12. *name and describe the types, causes and consequences of excessive and insufficient number of red blood cells*
13. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
14. *explain the function of white blood cells in General and the individual role of each type of white blood cell;*
15. *describe the appearance and relative prevalence of each type of white blood cell;*
16. *describe the formation and life history of white blood cells;*
17. *discuss the types, causes, and consequences of excessive and insufficient white blood cell counts*
18. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
19. *describe the mechanisms for controlling bleeding in the body;*
20. *list the functions of platelets;*
21. *describe the two reaction pathways that cause blood clots to form,*
22. *explain what happens to blood clots when they are no longer needed;*
23. *explain what keeps the blood from clotting in the absence of injury,*
24. *describe some blood clotting disorders*

25. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
26. *describe prenatal and postnatal hematopoiesis, stages of prenatal hematopoiesis. Erythropoiesis. The granulopoiesis. Monocytopoiesis. Lymphopoiesis.*
27. *Explain the stages of platelet formation*
28. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 12
Human tissue 3-4
Blood. Hemopoiesis
Maximum mark – 4
Erythrocytes, leukocytes, platelets. Hemopoiesis

1. discuss the structure of red blood cells (erythrocytes);
2. describe the structure of hemoglobin; discuss the structure of white blood cells; the structure of blood platelets.
3. Identify red blood cells, platelets and various types of white blood cells in blood smears under a microscope and microphotography
4. be willing and willing to learn how to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 13
Heart 1-2
Cardiac and Smooth Muscle. Overview of the Cardiovascular System. Gross Anatomy of the heart
Maximum mark – 4

1. Describe the structural and physiological differences between heart muscle and skeletal muscle;
2. explain why these differences are important for heart function;
3. describe the structural and physiological differences between smooth muscles and skeletal muscles;
4. link the unique properties of smooth muscles to their location and function
5. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
6. describe some blood clotting disorders,
7. identify and distinguish the pulmonary contour and the systemic contour;
8. describe the General location, size, and shape of the heart;
9. describe the pericardial SAC that covers the heart.
10. describe the three layers of the heart wall; identify the four chambers of the heart;
11. Determine the surface features of the heart of the bag and correlate them with its internal four-chamber anatomy;
12. identify the four valves of the heart;
13. trace the blood flow through the four chambers and valves of the heart and adjacent blood vessels;
14. describe the arteries that feed the myocardium and the veins that Deplete it
15. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 14
Heart 5
Cardiac Muscle and the Cardiac Conduction System. Electrical and Contractile Activity of the

Heart. Cardiac Output

Maximum mark – 4

1. *Describe and explain why the sinoatrial node starts spontaneously and rhythmically*
2. *Describe the unusual action potentials of the heart muscle*
3. *Link them to the contractile activity of the heart;*
4. *interpret the normal ECG*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
6. *Define cardiac output and explain its importance;*
7. *determine the factors that affect cardiac output*
8. *discuss some of the nerve and chemical factors that change heart rate, stroke volume, and cardiac output.*
9. *Explain how the right and left ventricles achieve balanced functioning;*
10. *describe some of the effects of exercise on heart output*
11. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
12. *describe the unique metabolic characteristics of the heart muscle;*
13. *explain the functional significance of intercellular connections between heart muscle cells;*
14. *describe the pacemaker and internal electrical conductivity system;*
15. *describe the nervous supply of the heart and explain its role*
16. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 15

Current control 2 "Circulatory system: blood and heart»

Maximum mark – 52

Demonstrate knowledge of the normal anatomy and physiology of the blood and heart system (including histology)

Practical lesson 16

Human tissue 5-6. Current control of Histology #1

Cardiovascular system. Heart. Layers of the Heart Wall. General description of vessels. Arteries and veins. Microcirculation stream. Arterioles. Capillaries. Venules.

Maximum mark – 4

1. *describe the structural features of the heart*
2. *explain how the heart conduction system works*
3. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
4. *describe the types of arteries, capillaries and veins, microscopic and ultramicroscopic features of the structure of arteries and veins, features of the structure of blood capillaries, the structure of microcirculation vessels.*
5. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 17

Blood vessels and circulation 1-3

General Anatomy of the Blood Vessels

Capillary Exchange. Venous Return and Circulatory Shock. Special Circulatory Routes

Maximum mark – 4

1. *Trace the General path that blood normally travels from the heart and back;*
2. *describe some variations on this route.*
3. *Describe how the materials get from the blood to the surrounding tissues;*
4. *describe and calculate the forces that allow capillaries to release and absorb liquid;*
5. *describe the causes and consequences of edema.*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
7. *Explain how the blood in the veins returns to the heart;*
8. *discuss the importance of physical activity for venous return;*
9. *discuss several causes of circulatory shock;*
10. *name and describe the stages of shock*
11. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
12. *Explain how the brain maintains stable perfusion;*
13. *discuss the causes and consequences of strokes and transient ischemic attacks;*
14. *explain the mechanisms that increase muscle perfusion during exercise;*
15. *Compare the blood pressure in the pulmonary circuit with the system pressure,*
16. *explain why the difference in lung function is important*
17. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 18
Blood vessels and circulation 4
Anatomy of the Pulmonary Circuit, Systemic Vessels of the Axial Region
Maximum mark – 4

1. Identify the main system arteries and veins of the axial region;
2. trace the blood flow from the heart to any major organ in the axial region and back to the heart.
3. Identify the main system arteries and veins of the extremities;
4. trace the blood flow from the heart to any area of the upper or lower limb and back to the heart;
5. trace the blood path through the pulmonary circuit
6. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 19
Biophysics 3-4
Blood Flow, Heart Sounds,and the Cardiac Cycle. Blood Pressure, Resistance, and Flow
Maximum mark – 4

1. Explain why blood pressure is expressed in millimeters of mercury;
2. describe how changes in blood pressure affect the heart valves;
3. explain what causes the heartbeat sounds.
4. Describe in detail one complete cycle of contraction and relaxation of the heart;
5. Link the stages of the heart cycle to the volume of blood entering and leaving the heart
6. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
7. Explain the relationship between blood pressure, resistance, and blood flow;
8. describe how blood pressure is expressed and how pulse pressure and average blood pressure are calculated;
9. describe three factors that determine blood flow resistance;

10. explain how the diameter of the vessel affects blood pressure and blood flow.
11. Explain and describe some local, neural, and hormonal effects on the diameter of the vessel
12. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 20
Blood vessels and circulation 5
Anatomy of the Systemic Vessels of the Appendicular Region
Maximum mark – 4

1. Identify the main system arteries and veins of the extremities;
2. trace the blood flow from the heart to any area of the upper or lower limb and back to the heart;
3. trace the blood path through the pulmonary circuit.
4. be willing and willing to learn how to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 21
Current control 3 «Circulatory system: blood vessels**»**
Maximum mark – 22

Demonstrate knowledge of normal vascular anatomy and physiology (including histology)

Practical lesson 22
The Respiratory System 1-2
Anatomy of the Respiratory System. Pulmonary Ventilation
Maximum mark – 4

1. formulate the functions of the respiratory system;
2. name and describe the organs of this system;
3. trace the air flow from the nose to the pulmonary alveoli;
4. connect the function of any part of the airway with its gross and microscopic anatomy.
5. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
6. name the respiratory muscles and describe their role in breathing;
7. describe the brain stem centers that control breathing and the information they receive from other levels of the nervous system;
8. explain how pressure gradients account for the flow of air into and out of the lungs, and how these gradients are created;
9. identify sources of resistance to air flow and discuss their relationship to breathing
10. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 23
The Respiratory System 3-4
Gas Exchange and Transport. Respiratory Disorders
Maximum mark – 4

1. *determine the partial pressure and discuss its relationship to a gas mixture such as air;*
2. *contrast the composition of the inhaled and alveolar air;*
3. *discuss how partial pressure affects the transport of gas by blood;*
4. *describe the mechanisms for transporting O2 and CO2;*

5. *what are the factors that regulate gas exchange in the lungs and systemic capillaries;*
6. *explain how gas exchange is regulated according to the metabolic needs of different tissues;*
7. *discuss the effect of blood gases and pH on the rhythm of breathing*
8. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
9. *explain the significance of anatomical dead space for alveolar ventilation;*
10. *determine clinical measurements of lung volume and capacity;*
11. *determine the conditions for various deviations from the normal breathing pattern*
12. *describe the forms and consequences of oxygen deficiency and excess oxygen;*
13. *describe chronic obstructive pulmonary disease and its consequences;*
14. *explain how lung cancer begins, progresses, and has a lethal effect*
15. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 24
Current control 4: Respiratory system
Maximum mark – 15

Demonstrate knowledge of the normal anatomy and physiology of the respiratory system (including histology)

Practical lesson 25
Human tissue 7-8
Respiratory system**:**nasal cavity, trachea, bronchi,bronchioles, alveolar ducts. Histology of urinary system
Maximum mark – 4

1. Describe the main components of the conducting and respiratory parts of the system (nasal cavity, trachea, bronchi, bronchioles, alveolar ducts), structural elements, blood-brain barrier,
2. identify the structural components of the nasal cavity, trachea, bronchi, bronchioles under a microscope and microphotographs
3. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
4. Describe the development and structure of the kidneys, renal tubules; reabsorption and secretion; renal endocrine system; urinary tract,
5. Identify the structural elements of the kidney cortex, kidney medulla, ureter, and bladder under a microscope and in microphotographs.
6. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 26
The urinary System 1-2
Functions of the Urinary System. Anatomy of the Kidney. Urine Formation I: Glomerular Filtration
Maximum mark – 4

1. name and locate the organs of the urinary system;
2. list several kidney functions in addition to the formation of urine;
3. describe the location and General appearance of the kidneys;
4. Determine the external and internal features of the kidneys;
5. trace the blood flow through the kidney;

6. trace the flow of fluid through the renal tubules; describe the nervous supply of the kidneys
7. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;
8. describe the process by which the kidney filters blood plasma, including the corresponding glomerular cell structure;
9. Explain the forces that promote and counteract filtration,
10. calculate the filtration pressure, taking into account the amount of these forces;
11. describe how the nervous system, hormones, and the nephron itself regulate filtration
12. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 27
Human Tissue 9. Current control of histology #2
Histology of urinary system
Maximum mark – 15

1. identify and distinguish the structural elements of the ureter, bladder under a microscope and microphotographs
2. be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 28
The urinary System 3-4
Urine Formation II:Tubular Reabsorption and Secretion. Urine Formation III: Water Conservation
Maximum mark – 4

1. *describe how the renal tubules reabsorb useful solutions from glomerular filtrate and return them to the blood;*
2. *describe how the tubules secrete dissolved substances from the blood into the tubular fluid;*
3. *describe how the nephron regulates water excretion.*
4. *explain how the collecting duct and antidiuretic hormone regulate the volume and concentration of urine;*
5. *explain how the kidney maintains an osmotic gradient in the kidney's brain matter that allows the collecting channel to function*
6. *be willing and willing to learn to be an effective team member, develop self-learning and problem-solving skills;*
7. *explain how the collecting duct and antidiuretic hormone regulate the volume and concentration of urine;*
8. *explain how the kidney maintains an osmotic gradient in the kidney's brain matter that allows the collecting channel to function;*
9. *describe the hormonal mechanism that regulates the rate of water loss in the body to the level of hydration or dehydration*
10. *be willing and willing to learn how to be an effective team member, develop self-learning and problem-solving skills;*

Practical lesson 29
The urinary System 5
Urine and Renal Function Tests
Maximum mark – 4

1. describe the functional anatomy of the ureters, bladder, male and female urethra;
2. explain how the nervous system and urethral sphincters control urination;

3. describe some of the physical and chemical properties of urine.
4. be willing and willing to learn how to be an effective team member, develop self-learning and problem-solving skills;

Practical lesson 30
Current control 5 – Urinary system. Recap: case study (capstone case)
Maximum mark – 20

Demonstrate knowledge of normal anatomy and physiology of the urinary system (including histology)
1. Demonstrate an understanding of the relationship between structure and function at the level of tissues, 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;
2. Demonstrate teamwork, self-learning, and problem-solving skills;

METHODICAL INSTRUCTIONS FOR THE LESSONS

The purpose 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.

Purposes:

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 main 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.

Rating for each topic:

Lesson	Title of the topic (lectures, practical classes, Independent work of students)	Max Mark
1	**Practical lesson 1** **The muscular system 1** The Functions of Muscles, Muscle Attachments. Functional Groups of Muscles, Innervation and Blood Supply,Muscle Names and Learning Strategy	4
2	**Practical lesson 2** **The muscular system 2** Behavior of whole Muscle	4
3	**Practical lesson 3** **Biophysics 1-2** The Nerve-Muscle Relationship Behavior of Skeletal Muscle Fibers	4
4	**Practical lesson 4** **The muscular system 3** Muscle Metabolism	4
5	**Practical lesson 5** **The muscular system 4-5** Muscles of the Anterior Abdominal Wall; Muscles of the Pelvic Floor; Muscles of the Back. Muscles of Respiration	4
6	**Practical lesson 6** **Human tissue 1-2** Microscopic Anatomy of Skeletal Muscle. Connective tissue of Skeletal muscle. Nerve tissue	4
7	**Practical lesson 7** **The muscular system 6** Muscles of the head and neck	4
8	**Practical lesson 8** **The muscular system 7** Muscles Acting on the Shoulder and Arm; Muscles Acting on the Forearm, the Wrist and Hand	4
9	**Practical lesson 9** **The muscular system 8** Muscles Acting on the Hip and Femur,Muscles Acting on the Knee and Leg.	4

	Muscles Acting on the Foot, Intrinsic Muscles of the Foot	
10	**Practical lesson 10** **Current Control 1**	54
	IWST: Passing the IWS 1 –«The role of facial muscles in various facial expressions» - work in groups	10
	MT 1	100
11	**Practical lesson 11** **Blood**	4
12	**Practical lesson 12** **Human tissue 3-4** **Blood. Hemopoiesis** Erythrocytes, leukocytes, platelets. Hemopoiesis	4
13	**Practical lesson 13** **Heart 1-2** Cardiac and Smooth Muscle. Overview of the Cardiovascular System. Gross Anatomy of the heart	4
14	**Practical lesson 14** **Heart 5** Cardiac Muscle and the Cardiac Conduction System. Electrical and Contractile Activity of the Heart. Cardiac Output	4
15	**Practical lesson 15** **Current Control 2**	52
16	**Practical lesson 16** **Human tissue 5-6. Current control of Histology #1** Cardiovascular system. Heart. Layers of the Heart Wall. General description of vessels. Arteries and veins. Microcirculation stream. Arterioles. Capillaries. Venules.	4
17	**Practical lesson 17** **Blood vessels and circulation 1-3** General Anatomy of the Blood Vessels Capillary Exchange. Venous Return and Circulatory Shock. Special Circulatory Routes	4
18	**Practical lesson 18** **Blood vessels and circulation 4** Anatomy of the Pulmonary Circuit, Systemic Vessels of the Axial Region	4
19	**Practical lesson 19** **Biophysics 3-4** Blood Flow, Heart Sounds,and the Cardiac Cycle. Blood Pressure, Resistance, and Flow	4
	IWST: Passing the IWS 2 «Anatomical Patterns of Superficial Cubital Veins» - work in groups	5
	MT 2	100
20	**Practical lesson 20**	4

	Blood vessels and circulation 5 Anatomy of the Systemic Vessels of the Appendicular Region	
21	**Practical lesson 21** **Current control 3**	22
22	**Practical lesson 22** **The Respiratory System 1-2** Anatomy of the Respiratory System. Pulmonary Ventilation	4
23	**Practical lesson 23** **The Respiratory System 3-4** Gas Exchange and Transport. Respiratory Disorders	4
24	**Practical lesson 24** **Current control 4**	15
25	**Practical lesson 25** **Human tissue 7-8** Respiratory system**:**nasal cavity, trachea, bronchi,bronchioles, alveolar ducts. Histology of urinary system	4
26	**Practical lesson 26** **The urinary System 1-2** Functions of the Urinary System. Anatomy of the Kidney. Urine Formation I: Glomerular Filtration	4
27	**Practical lesson 27** **Human Tissue 9. Current control of histology #2** Histology of urinary system	4
28	**Practical lesson 28** **The urinary System 3-4** Urine Formation II:Tubular Reabsorption and Secretion. Urine Formation III: Water Conservation	4
29	**Practical lesson 29** **The urinary System 5** Urine and Renal Function Tests	4
30	**Practical lesson 30** **Current control 5. Recap: case study (capstone case)**	20
	MT 3	100

A FEW TIPS FOR TEAMWORK AND TRAINING

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 SRS, 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:

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3. Leslie P. Gartner: Color Atlas and Text of Histology. - 7th Edition. - Wolters Kluwer, 2017. ISBN 1496346734, 9781496346735
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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
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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&

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