

**Al-Farabi Kazakh National University**  
**Faculty of medicine and health care**  
**Higher School of Medicine**  
**Department of Fundamental medicine**

**METHODOLOGICAL INSTRUCTIONS TO PRACTICAL LESSONS**

for the discipline MiF1202 " Morphology and human physiology"

(11 credits)

**Fall semester, academic year 2022-2023**

**Practical lesson1**

**Topic:** Introduction to anatomy and physiology;Anatomical Position;Anatomical Planes; Directional Terms;Major Body Regions;Body Cavities and Membranes;Organ Systems

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Define anatomy ,physiology relate them to each other.*
2. *Define homeostasis, explain its significance, and discuss how it is maintained by negative feedback;*
3. *Discuss positive feedback and its effects on the body;*
4. *Define or demonstrate the anatomical position and explain its importance in descriptive anatomy;*
5. *Define the three major anatomical planes of the body;*
6. *Identify the major anatomical regions of the body;*
7. *Describe the body's cavities and the membranes that line them;*
8. *Name the 11 organ systems, their principal organs, and their functions.*

**Practical lesson2**

**Topic:** Structure and functions of the skin;Structure and functions of the Cutaneous Glands, dermal circulation;

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *List the functions of the skin and relate them to its structure;*
2. *Identify and name the following skin structures: epidermis, dermis (papillary and reticular layers), hair and hair follicle, sebaceous gland, and sweat gland.*
3. *Describe the distribution and function of the epidermal appendages—sebaceous and ceruminous glands, sweat glands, hair, and nails.*
4. *Describe the normal and pathological colors that the skin can have, and explain their causes;*
5. *Describe the role of dermal circulation;*

**Practical lesson 3**

**Topic:**Overview of skeletal system and Osseous Tissue; Gross Anatomy of Bones Bone Development and Metabolism

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *State functions of the skeletal system;*
2. *Describe the general features of a long bone and a flat bone;*
3. *Describe briefly the process of bone formation in the fetus, and summarize the events of bone remodeling throughout life.*
4. *Discuss the role of the bones in Mineral Homeostasis.*
5. *Name the main hormones that regulate bone physiology, and describe their effects;*

#### **Practical lesson 4**

**Topic:**Subdivisions of the skeleton ; Bones associated with the Skull (Cranial and Facial Bones)

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Define the two subdivisions of the skeleton;*
2. *Define several terms that denote surface features of bones;*
3. *Name the bones and cavities of the skull and their anatomical features; and identify them from model or diagrams.*

#### **Practical lesson 5**

**Topic:** General Features of the Vertebral Column, General Structure of a Vertebra, Intervertebral Discs; Regional Characteristics of Vertebrae, Thoracic Cage

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Describe the general features of the vertebral column, intervertebral discs and those of a typical vertebra ;*
2. *Explain how the abnormal spinal curvatures (scoliosis, lordosis, and kyphosis) differ from one another.*
3. *Describe the special features of vertebrae in different regions of the vertebral column;*
4. *Name the components of the thoracic cage.*
5. *Describe the anatomy of the sternum and ribs and how the ribs articulate with the thoracic vertebrae*

#### **Practical lesson 6**

**Topic:** The pectoral girdle ; The upper limbs

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Identify and describe the features of the bones of the pectoral girdle and the attached limbs .*
2. *Describe and Identify the major features of individual bones from model and diagrams*

#### **Practical lesson 7**

**Topic:** The pelvic girdle ; The lower limbs

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Identify and describe the features of the bones of the pelvic girdles and the attached limbs.*
2. *Describe and Identify the major features of individual bones from model and diagrams.*
3. *Compare the anatomy of the male and female pelvic girdles and explain the functional significance of the differences;*

#### **Practical lesson 8**

**Topic:** Joints and Their Classification; Jaw and knee joints.

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Explain what joints are, how they are named, and what functions they serve;*
2. *Name and describe the four major categories of joints;*
3. *Identify the anatomical components of a typical synovial joint;*
4. *Identify the major anatomical features of the jaw, knee joints;*
5. *Demonstrate or identify the different types of body movements.*

### **Practical lesson 9**

**Topic:**The Functions of Muscles; The Nerve–Muscle Relationship; Physiology of Skeletal Muscle  
Cardiac and Smooth Muscle

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Summarize the functions of muscular tissue;*
2. *Describe the structure of a skeletal muscle fiber and relate this to its function; and describe the nerve–muscle relationship in skeletal muscle.*
3. *Describe the physiological properties that all muscle types have in common;*
4. *Explain the mechanisms of muscle contraction and relaxation;*
5. *Describe similarities and differences in the structure and function of the three types of muscle tissue, and indicate where they are found in the body.*

### **Practical lesson 10**

**Topic:**General Aspects of Muscle Anatomy ; Muscles of the head and neck.

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Describe the relationship of muscle fibers to connective tissues in a muscle;*
2. *Explain how muscles act in groups to govern the movements of a joint;*
3. *Name and locate the muscles that produce facial expressions, the muscles used for chewing and swallowing; the neck muscles that move the head; and Identify the attachments, action of these muscles.*

### **Practical lesson 11**

**Topic:**Muscles of Respiration ; Muscles of the Anterior Abdominal Wall and back.

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Name and locate the muscles of the abdominal wall, Respiration and back;*
2. *Identify them from a model or diagram.*

### **Practical lesson 12**

**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 locate the muscles that act on the pectoral girdle, shoulder, elbow, wrist, and hand; and Relate the actions of these muscles to the joint movements;*
2. *Identify the muscles from model or diagram*

### **Practical lesson 13**

**Topic:** Muscles Acting on the Hip and Femur; Muscles Acting on the Knee.

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Name and locate the muscles that act on the hip, knee joints; and Relate the actions of these muscles to the joint movements;*
2. *Identify the muscles from model or diagrams.*

**Practical lesson 14**

**Topic:** Muscles Acting on the 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 ankle, and toe joints; and Relate the actions of these muscles to the joint movements;*
- 2. Identify the muscles from model or diagrams*

**Practical lesson 15**

**Topic:** Whole-Muscle Contraction ; Muscle Metabolism

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. Describe and explain twitch, summation, and other aspects of muscle behavior;*
- 2. Contrast isometric and isotonic contraction;*
- 3. Describe two ways in which muscle meets the energy demands of exercise;*
- 4. Discuss the factors that cause muscle fatigue and limit endurance;*
- 5. Distinguish between fast and slow types of muscle fibers; and*
- 6. Identify some variables that determine muscular strength.*

**Practical lesson 16**

**Topic:** Introduction to the circulatory system; Erythrocytes ; Blood Types

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. Describe the functions and major components of the circulatory system;*
- 2. Describe the components and physical properties of blood and blood plasma; and discuss its importance in the body.*
- 3. Explain the significance of blood viscosity and osmolarity;*
- 4. Describe the structure and explain the function of red blood cells; characterize the structure and function of hemoglobin;*
- 5. Define some clinical measurements of RBC and hemoglobin quantities and give some typical values for each;*
- 6. Discuss the life cycle of erythrocytes;*
- 7. Explain the molecular basis of blood types and their clinical significance.*

**Practical lesson 17**

**Topic:** Leukocytes; Platelets and Hemostasis, The Control of Bleeding

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. Discuss the general function of leukocytes and the specific functions of each individual type*
- 2. Characterize the appearance and relative abundance of each type of leukocyte;*
- 3. Describe the life cycle of leukocytes.*
- 4. Describe the structure and functions of blood platelets;*
- 5. Describe platelet production*
- 6. Describe blood clotting and other mechanisms for controlling bleeding.*

**Practical lesson 18**

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

**Numbers of hours - 2**

**Maximum mark - 2****Learning outcomes:**

1. *Distinguish between the pulmonary circuit and systemic circuit;*
2. *Describe the general location, size, and shape of the heart;*
3. *Describe and Identify the coverings, the surface anatomy, tissue layers and internal features of the heart and associated great vessels;*
4. *Identify and Trace the coronary circulation.*
5. *Describe the the pathway blood through the heart and Explain the operation of the heart valves.*

**Practical lesson 19**

**Topic:** Cardiac Muscle and the Cardiac Conduction System; Electrical and Contractile Activity of the Heart

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Describe the unique metabolic characteristics of cardiac muscle;*
2. *Explain the functional significance of the intercellular junctions between cardiac muscle cells;*
3. *Describe the heart's pacemaker and internal electrical conduction system and the pathway of impulses through this system.*
4. *Describe the nerve supply to the heart and explain its role*
5. *Explain why the SA node fires spontaneously and rhythmically*
6. *Describe the unusual action potentials of cardiac muscle and relate them to the contractile behavior of the heart;*

**Practical lesson 20**

**Topic:** Cardiac cycle and heart sound; Cardiac output

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes**

1. *Describe the relationship between blood pressure and blood flow*
2. *Summarize and explain the connection between the various events of the cardiac cycle*
3. *Compare atrial and ventricular systole and diastole*
4. *Relate heart sounds detected by auscultation to action of heart's valves*
5. *Define cardiac output and Describe factors that effect cardiac output and be able to calculate it*
6. *Identify cardiovascular centers and cardiac reflexes that regulate heart function*
7. *Summarize factors affecting stroke volume, heart rate and cardiac output*

**Practical lesson 21**

**Topic:** General Anatomy of the Blood Vessels ; Physiology of Circulation. Current control -1

**Numbers of hours - 2**

**Maximum mark - 55**

**Learning outcomes:**

1. *Describe the structure of a blood vessel;*
2. *Compare and contrast arteries, capillaries, and veins;*
3. *Explain how portal systems and anastomoses differ from the most common route in which blood flows from the heart and back again.*
4. *Define blood pressure; and Explain the relationship between blood pressure, resistance, and flow;*
5. *Describe three factors that determine resistance to blood flow;*
6. *Discuss local, neural, and hormonal control of blood pressure;*
7. *Explain how blood pressure and osmotic pressure interact in capillary fluid exchanges;*
8. *Describe the mechanisms for returning venous blood to the heart.*

### **Practical lesson 22**

**Topic:**Anatomy of the Pulmonary Circuit; Systemic Vessels of the Axial Region

**Numbers of hours - 2**

**Maximum mark - 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. Trace the route of blood through the pulmonary circuit.trace the route of blood through the pulmonary circuit;*

### **Practical lesson 23**

**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;*

### **Practical lesson 24**

**Topic:** Overview of the Lymphatic and immune system

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. List the functions and basic components of the lymphatic system;*
- 2. Explain how lymph is returned to the bloodstream;*
- 3. Describe and Identify the major lymphatic tissues and organs, and describe their location, structure, and functions.*
- 4. Define immune system, innate immunity, and adaptive immunity;*
- 5. Enumerate the defensive functions of each kind of white blood cell*

### **Practical lesson 25**

**Topic:**General Anatomy of the Respiratory System

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. List state the functions of the respiratory system;*
- 2. Name and Identify the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs (on a diagram or model), and describe the function of each.*
- 3. Describe the structure and function of the lungs, the pleural coverings and the respiratory membrane.*

### **Practical lesson 26**

**Topic:**Pulmonary Ventilation;Gas Exchange and Transport

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

- 1. Name the muscles of respiration and describe their roles in inspiration and expiration;*
- 2. Describe the brainstem centers that control breathing and the inputs they receive from other parts of the nervous system.*
- 3. Define partial pressure and explain how it affects diffusion of gases across the respiratory membrane;*
- 4. Describe gas exchange in the lungs and systemic capillaries;*

5. Describe how  $O_2$  and  $CO_2$  are transported in the blood;
6. Explain the effect of blood gases and pH on the respiratory rhythm

### **Practical lesson 27**

**Topic:** Functions of the Urinary System ;Anatomy of the Kidney, ureters, urinary bladder, and urethra

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Name and locate the organs of the urinary system; and Describe the location and general appearance of the kidneys;
2. Describe macroscopic and microscopic anatomy of the kidney and Identify them in the model or diagrams ;
3. List several functions of the kidneys in addition to urine formation;
4. Trace the flow of blood through the kidney;
5. Trace the flow of fluid through the renal tubules;
6. Describe the nerve supply to the kidney.
7. Describe the morphology and function of the nephron.
8. Identify the ureters, urinary bladder, and urethra, as well as their location, structure and function

### **Practical lesson 28**

**Topic:** Urine Formation I: Glomerular Filtration.

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Describe the process by which the kidney filters the blood plasma;
2. Describe how the sympathetic nervous system, hormones, and the kidney itself regulate filtration.
3. Describe how the renal tubules reabsorb water and useful solutes from the glomerular filtrate and return them to the blood;

### **Practical lesson 29**

**Topic:** The Urinary System II. Tubular Reabsorption and Secretion and Water Conservation

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Describe how the tubules secrete solutes from the blood into the tubular fluid.
2. Explain how the collecting duct and antidiuretic hormone regulate the volume and concentration of urine;
3. Explain how the kidney maintains an osmotic gradient in the renal medulla that enables the collecting duct to function;
4. Describe the hormonal mechanism for adjusting the body's rate of water loss to its state of hydration or dehydration.

### **Practical lesson 30**

**Topic:** Fluid Balance; Electrolyte Balance; Acid Base Balance

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Name the major fluid compartments;
2. List the body's sources of water and routes of water loss;
3. Define plasma osmolality and identify two ways in which plasma osmolality is maintained
4. Describe mechanisms of regulating water intake and output;
5. Identify the six ions most important to the function of the body and list their function.
6. Explain how electrolyte balance is regulated;

7. Describe three ways the body regulates pH.

### **Practical lesson 31**

**Topic:** Nutrition; Metabolic States and Metabolic Rate

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Define nutrient and list the six major categories of nutrients;
2. Distinguish the absorptive (fed) state from the postabsorptive (fasting) state; and Describe the hormonal and nervous regulation of each state;
3. Explain what happens to carbohydrates, fats, proteins, and amino acids in each of these states;
4. Describe how the hypothalamus monitors body temperature and how the heat-losing and heat-promoting centers work;

### **Practical lesson 32**

**Topic:** General Anatomy and Digestive Processes ;The Mouth Through Esophagus

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Name the alimentary canal and the accessory digestive organs; and List their functions and major physiological processes of the digestive system;
2. Distinguish between mechanical and chemical digestion;
3. Describe the four fundamental tissue layers of the alimentary canal and the function of each layer
4. Contrast the contributions of the enteric and autonomic nervous systems to digestive system functioning
5. Explain how the peritoneum anchors the digestive organs
6. Name the major substrates and products of this process;
7. List the regions of the digestive tract and the accessory organs of the digestive system;
8. Describe the gross anatomy of the digestive tract from the mouth through the esophagus;

### **Practical lesson 33**

**Topic:**The Stomach ; The Liver, Gallbladder, and Pancreas

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Describe the functional anatomy of the stomach
2. Identify the four main types of secreting cells in gastric glands, and their important products
3. Explain the mechanism of stomach does not digest itself
4. Describe the mechanical and chemical digestion of food entering the stomach and Describe any absorption that happens in the stomach
5. Describe the gross anatomy of the liver, gallbladder, bile duct system, and pancreas and Identify them from model or diagram ;
6. Describe the digestive secretions and functions of the liver, gallbladder, and pancreas;
7. Explain how hormones regulate secretion by the liver and pancreas.

### **Practical lesson 34**

**Topic:**The Small Intestine and Large Intestine; Chemical Digestion and Absorption

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Describe the gross anatomy of the small and large intestines and Identify them from model or diagram ;

2. Describe the features unique to the wall of the intestines and identify their contributions to its function; and Distinguish the difference and explain the functional significance of the differences;
3. Describe the types of movement that occur in the small intestine and large intestine;
4. Identify the beneficial roles of the bacterial flora in digestive system functioning.
5. Describe how each major class of nutrients is chemically digested, name the enzymes involved; and Discuss the functional differences among these enzymes;

### **Practical lesson 35**

**Topic:** Overview of nervous system; The basic structure and Physiology of Neurons

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. State three fundamental functions of the nervous system;
2. Define the two major anatomical subdivisions of the nervous system;
3. Define three functional categories of neurons;
4. Describe the structure of a generalized neuron and the common variations on this structure;
5. Describe the mechanism behind the voltage changes that occur when a neuron is stimulated;
6. Explain how a neuron conducts a signal from the soma to the end of its axon; transmits information to the next cell;

### **Practical lesson 36**

**Topic:** The Spinal Cord; The Spinal nerves; Somatic Reflexes

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Identify the anatomical and functional divisions of the nervous system; and List the basic functions of the nervous system
2. Describe the basic anatomy of nerves and ganglia, anatomy of the spinal nerves and the three protective membranes that envelop the spinal cord; and Identify them from model or diagrams ;
3. Describe the functions of the spinal cord;
4. State the universal characteristics of reflexes and distinguish between somatic and visceral reflexes;
5. Identify the basic components of a somatic reflex arc; and explain the mechanisms of stretch and withdrawal reflexes.
6. Name the four major nerve plexuses, give the major nerves of each, and describe their distribution.

### **Practical lesson 37**

**Topic:** Overview of the brain

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Describe the major subdivisions and anatomical landmarks of the brain;
2. Describe the locations of the gray and white matter of the brain;
3. Name and describe the three meninges that enclose the brain;
4. Describe the system of chambers and channels in the brain and the flow of cerebrospinal fluid through this system;
5. Describe the brain's blood supply and the selective barrier between the blood and brain tissue.

### **Practical lesson 38**

**Topic:** Principal Divisions of the Brain

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. List the parts of the brainstem and describe their structure and function;

2. Describe the structure and function of the cerebellum;
3. Describe the locations of the gray matter and tracts of white matter in the cerebrum;
4. List the five lobes of the cerebrum, identify their anatomical boundaries, and state their functions;
5. Describe the limbic system and identify its major functions.

### **Practical lesson 39**

**Topic:** Multiregional Brain Functions ;The Cranial Nerves

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Identify the destinations of different types of sensory signals going to the brain;
2. Identify some of the conscious, thinking (cognitive) areas of the brain;
3. Identify areas of the brain involved in the creation of memories and in memory storage and retrieval;
4. Describe how the brain controls the skeletal muscles;
5. Describe the locations and functions of the language centers of the brain;
6. Discuss the functional relationship between the right and left cerebral hemispheres
7. List the 12 cranial nerve pairs by name and number and state the functions of each cranial nerve.

### **Practical lesson 40**

**Topic:**The Autonomic Nervous System

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Distinguish between the autonomic nervous system (ANS) and the somatic motor nervous system; and Name and compare the two subdivisions of the ANS;
2. Identify some visceral reflexes; and discuss the relevance of visceral reflexes to homeostasis;
3. Explain the relationship of the adrenal medulla and enteric nervous system to the ANS;
4. Explain how the sympathetic and parasympathetic divisions can have cooperative or antagonistic effects on various organs.

### **Practical lesson 41**

**Topic:** Overview of the Endocrine System ;Endocrine Physiology

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Define hormone and endocrine system;
2. Name and Identify the major organs of the endocrine system and their location in the body;
3. Characterize the three chemical classes of hormones and state examples of each;
4. Describe how hormones act on their target cells and receptors; the factors Affecting Target Cell Response
5. Discuss some types of interaction between multiple hormones;
6. Explain how the body regulates rates of hormone secretion;

### **Practical lesson 42**

**Topic:** The Hypothalamus and Pituitary Gland;Other Endocrine Glands

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. Explain the anatomical and functional relationships of the hypothalamus and the posterior and anterior lobes of the pituitary gland
2. List the two hormones released from the posterior pituitary, their target cells, and principal actions

3. *List the six hormones produced by the anterior lobe of the pituitary gland, their target cells, their principal actions, and regulation by the hypothalamus*
4. *List the hormones produced by the thyroid gland, parathyroid glands, adrenal cortex and adrenal medulla, pineal gland, Pancreas, testes and ovaries and summarize their target cells and effects*
5. *Describe the hormones produced by organs with secondary endocrine functions, and their effects*

### **Practical lesson 43**

**Topic:**Receptors and Sensations; The General Senses;Chemical sensation-taste

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Define receptor and sense organ; and List the four kinds of information obtained from sensory receptors*
2. *Classify the human sense organs into broad functional categories.*
3. *Describe some relatively simple and widespread sensory nerve endings and the sensations associated with them;*
4. *Define and distinguish some types of pain; and Identify some chemicals that stimulate pain receptors*
5. *Describe the receptor cells for taste and identify their anatomical locations;*

### **Practical lesson 44**

**Topic:**The male and female reproductive system

**Numbers of hours - 2**

**Maximum mark - 2**

**Learning outcomes:**

1. *Describe the structure, locations, and functions of the male reproductive system; and Identify them from model or diagram.*
2. *Describe the functions of the male reproductive systems;*
3. *Trace the pathway taken by a sperm cell from its formation to ejaculation, naming all the passages that it travels;*
4. *Describe the structure, locations, and functions of the female reproductive system; and Identify them from model or diagram.*
5. *Enumerate the functions of the female reproductive systems;*
6. *Distinguish between the gonads of the two sexes, and between the internal and external genitalia.*
7. *Describe the male and female sexual development from puberty through menopause.*

### **Practical lesson 45**

**Topic:** Current control -2

**Numbers of hours - 2**

**Maximum mark - 49**

## 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)**

<b>Mark</b>	<b>Criteria</b>	<b>Scale, points</b>
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)	<ol style="list-style-type: none"> <li>1. most or all of the key aspects are omitted;</li> <li>2. no focus on the question, not much related to the issue of information;</li> <li>3. significant gaps in theoretical questions, or their superficial consideration;</li> <li>4. the lack of examples or irrelevant examples;</li> <li>5. there is no analysis and no theoretical justification for the given problem (if applicable), most of the key aspects are omitted;</li> <li>6. problems in using professional terminology</li> </ol>	0-24
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### **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	<i>Preparing for classes:</i> Examines information focused on the case and issues of concern, uses various sources, and supports claims with appropriate links
2	<i>Group skills and professional attitude:</i> Demonstrates excellent attendance, reliability, and responsibility Takes the initiative, actively participates in the discussion, helps group members, willingly takes tasks
3	<i>Communication skills:</i> 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	<i>Skills for providing feedback:</i> 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	<i>Critical thinking and effective learning skills:</i> 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	<i>Theoretical knowledge and skills on the topic of the lesson:</i> 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: Essentials of Anatomy & Physiology. (2018, McGraw-Hill Education)

1. Costanzo, Linda S.: BRS Physiology. Board Review Series.7 edition. -Wolters Kluwer Health, 2018.- 307p. - ISBN 1496367693, 9781496367693
2. Leslie P. Gartner: Color Atlas and Text of Histology. - 7th Edition. - Wolters Kluwer, 2017. ISBN 1496346734, 9781496346735
3. Russell K. Hobbie, Bradley J. Roth: Intermediate Physics for Medicine and Biology. - Springer, 2015. - ISBN 3319126822, 9783319126821
4. Andersson D, Medical Terminology: The Best and Most Effective Way to Memorize, Pronounce and Understand Medical Terms: Second Edition, ISBN-13 : 978-1519066626, 2016

**Additional literature:**

5. Standring, Susan: Gray's Anatomy: The Anatomical Basis of Clinical Practice. - 41 Elsevier Limited, 2016
6. Elaine N. Marieb, Lori A. Smith: Human Anatomy & Physiology Laboratory Manual, Main Version. - 11 edition. - Pearson Education,2015. - ISBN 9780133999143
7. Scanlon V. C, Essentials of Anatomy and Physiology 8th Edition, F.A. Davis Company, 2018
8. Victor P. Eroschenko, Atlas of Histology with Functional Correlations 13th Edition, LWW, 2017
9. William Bialek: Biophysics: Searching for Principles. -Princeton University Press, 2012. - ISBN 0691138915, 9780691138916

**Online resources:**

1. <https://app.lecturio.com/#/>
2. <https://3d4medical.com/>
3. [https://www.youtube.com/channel/UCc\\_I2c2bUtO0p4DVeo6-Kxg](https://www.youtube.com/channel/UCc_I2c2bUtO0p4DVeo6-Kxg)
4. <https://sites.google.com/a/umich.edu/bluelink/curricula/anatomy-403?authuser=0>