Al-Farabi Kazakh National University
Higher School of Medicine
Department of Fundamental Medicine
Tasks for practical lessons of the discipline
"Normal structure and function of human body"

The lymphatic and immune system:

Max grade – 3

1. *List the functions of the lymphatic system;*
2. *Explain how lymph forms and returns to the bloodstream;*
3. *Name the major cells of the lymphatic system and state their functions;*
4. *Describe the structure and function of the red bone marrow, thymus, lymph nodes, tonsils, and spleen*

Fluid Balance Electrolyte Balance and Acid–Base Balance

Fluid Balance and Electrolyte and Acid-base Balance :

Max grade – 3

1. *Name the major fluid compartments;*
2. *List the body's sources of water and routes of water loss;*
3. *Describe mechanisms of regulating water intake and output;*
4. *List the functions of sodium and potassium;*
5. *Explain how electrolyte balance is regulated;*
6. *Describe three ways the body regulates pH.*

Histology of the Lymphatic System

Cells of the lymphatic system, types of lymphatic tissue, red bone marrow, thymus, lymph nodes, tonsils, and spleen:

Max grade – 3

1. *Name the major cells of the lymphatic system; N*
2. *Name and describe the types of lymphatic tissue;*
3. *Describe the structure of the red bone marrow, thymus, lymph nodes, tonsils, and spleen*

The digestive system I
General Anatomy and Digestive Processes
The Mouth Through Esophagus. The Stomach:

Max grade – 3

1. *List the functions and major physiological processes of the digestive system;*
2. *Distinguish between mechanical and chemical digestion;*
3. *Identify the basic chemical process that underlies all chemical digestion, name the major substrates and products of this process;*
4. *List the regions of the digestive tract and the accessory organs of the digestive system;*
5. *Describe the general nervous and chemical controls over digestive;*
6. *Describe the gross anatomy of the digestive tract from the mouth through the esophagus;*
7. *Identify the esophagus in the model;*
8. *Describe the composition and functions of saliva;*
9. *Describe the nervous control of salivation and swallowing.*
10. *Describe the gross anatomy of the stomach;*

11. *Identify the stomach in the model;*
12. *State the function of each type of epithelial cell in the gastric mucosa;*
13. *Identify the secretions of the stomach and state their functions;*
14. *Explain how the stomach produces hydrochloric acid and pepsin;*
15. *Describe the contractile responses of the stomach to food;*
16. *Describe the three phases of gastric function and how gastric activity is activated and inhibited.*

The digestive system II

The Liver, Gallbladder, and Pancreas. The Small Intestine and Large Intestine

Max grade – 3

1. *Describe the gross anatomy of the liver, gallbladder, bile duct system, and pancreas;*
2. *Identify the liver, gallbladder, bile ducts, and pancreas in the model;*
3. *Describe the digestive secretions and functions of the liver, gallbladder, and pancreas;*
4. *Explain how hormones regulate secretion by the liver and pancreas.*
5. *Describe the gross anatomy of the small intestine;*
6. *Identify the small intestine's parts in the model, and in the picture;*
7. *State how the mucosa of the small intestine differs from that of the stomach, and explain the functional significance of the differences;*
8. *Define contact digestion and describe where it occurs; describe the types of movement that occur in the small intestine;*
9. *Describe how each major class of nutrients is chemically digested, name the enzymes involved;*
10. *Discuss the functional differences among these enzymes;*
11. *Describe how each type of nutrient is absorbed by the small intestine.*
12. *Describe the gross anatomy of the large intestine;*
13. *Summarize the functions of the large intestine;*
14. *Contrast the mucosa of the colon with that of the small intestine;*
15. *State the physiological significance of intestinal bacteria;*
16. *Discuss the types of contractions that occur in the colon;*
17. *Explain the neurological control of defecation.*

Histology of digestive system

Max grade – 3

Microscopic Anatomy of digestive organs and tissue

Digestive system. Pharynx, esophagus, stomach, small intestine, colon.

1. *Identify organs, tissues and their structural components at the microscopic level.*
2. *Describe the general plan of the structure of the hollow organs of the digestive system.*
3. *Identify esophagus, its tissue structure in the upper, middle and lower third of the esophagus.*
4. *Identify the cells of the glands of the stomach and intestinal epithelium at the microscopic and ultramicroscopic level;*
5. *Describe the microscopic anatomy of the small intestine and large intestine; describe the mucosa of the small intestine and the mucosa of the colon.*

Nutrition and metabolism I

Nutrition Metabolic States and Metabolic Rate Body Heat and Thermoregulation

Max grade – 3

1. *Describe some factors that regulate hunger and satiety;*
2. *Define nutrient and list the six major categories of nutrients;*
3. *State the function of each class of macronutrients, the approximate amounts required in the diet, and some major dietary sources of each;*
4. *Name the blood lipoproteins, state their functions, and describe how they differ from each other;*
5. *Name the major vitamins and minerals required by the body and the general functions they serve.*
6. *Identify the normal indicators of the blood lipoproteins, glucose, cholesterols taking into account age, sex and individual characteristics*
7. *Define* the *absorptive* and *postabsorptive states;*
8. *Explain what happens to carbohydrates, fats, and proteins in each of these states;*
9. *Describe the hormonal and nervous regulation of each state;*
10. *Define metabolic rate and basal metabolic rate;*
11. *Describe some factors that alter the metabolic rate;*
12. *Identify the principal sources of body heat;*
13. *Describe some factors that cause variations in body temperature;*
14. *Define and contrast the different forms of heat loss;*
15. *Describe how the hypothalamus monitors and controls body temperature;*
16. *Describe conditions in which the body temperature is excessively high or low.;*

Current Control- 1--Digestive system and lymphatic system

Max grade – 43

1. Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic Digestive system and Lymphatic system
2. Demonstrate knowledge of physiology on the topic Fluid, Electrolyte and Acid-base balance

Histology of digestive system

Max grade – 3

Microscopic Anatomy of digestive organs and tissue

Liver, pancreas.

1. *Describe of the features of blood supply to the liver;*
2. *Sources of development of the liver and pancreas.*
3. *Describe the microscopic anatomy of the liver, gallbladder, bile duct system, and pancreas;*
4. *Clarify the microscopic and ultramicroscopic structure of hepatocytes and their functional significance;*

The Endocrine System I
Overview of the Endocrine System
The Hypothalamus and Pituitary Gland

Max grade – 3

1. *Define hormone and endocrine system;*
2. *Name several organs of the endocrine system;*
3. *Identify the structure and lobuses the thyroid gland;*
4. *Contrast endocrine with exocrine glands; recognize the standard abbreviations for many hormones;*
5. *Describe similarities and differences between the nervous and endocrine systems.*
6. *Describe the structure and location of the remaining endocrine glands;*
7. *Name the hormones these endocrine glands produce, what stimulates their secretion, and their functions;*
8. *Discuss the hormones produced by organs and tissues other than the classical endocrine glands.*

The Endocrine System II
Other Endocrine Glands

Max grade – 3

1. *Define hormone and endocrine system;*
2. *Name several organs of the endocrine system;*
3. *Identify the structure and lobuses the thyroid gland;*
4. *Contrast endocrine with exocrine glands; recognize the standard abbreviations for many hormones;*
5. *Describe similarities and differences between the nervous and endocrine systems.*
6. *Describe the structure and location of the remaining endocrine glands;*
7. *Name the hormones these endocrine glands produce, what stimulates their secretion, and their functions;*
3. *Discuss the hormones produced by organs and tissues other than the classical endocrine glands.*

Histology of Endocrine System I
Microscopic Anatomy of endocrine organs and tissue
Endocrine system. Central endocrine system. Hypothalamus, pituitary, pineal gland.

Max grade – 3

1. *Describe the microscopic anatomy of portion of the endocrine system;*
2. *Describe the histology of endocrine system;*
3. *Recognize the organs of the endocrine system on their constituent tissue elements at the microscopic and ultramicroscopic levels.*
4. *Characterize the embryonic sources of development and the general laws of the structure, morphofunctional features of the organs of the endocrine system*
5. *Explain the participation of the endocrine system in the regulation of various body functions.*

The Endocrine System III
Hormones and Their Actions

Max grade – 3

1. *Explain some general causes and examples of hormone hyposecretion and hypersecretion;*

2. *Briefly describe some common disorders of pituitary, thyroid, parathyroid, and adrenal function; in more detail,*
3. *Describe the causes and pathology of diabetes mellitus;*

Histology of Endocrine System II
Microscopic Anatomy of endocrine organs and tissue
Peripheral endocrine system. Adrenal gland, thyroid, parathyroid glands. CC1
Max grade – 18

1. *Recognize the organs of the endocrine system on their constituent tissue elements at the microscopic and ultramicroscopic levels.*
2. *Characterize the embryonic sources of development and the general laws of the structure, morphofunctional features of the organs of the endocrine system.*

Histology Reproductive system
Sexual Reproduction and Development
Max grade – 3

1. *Define explain why sexual reproduction in humans requires two different types of gametes;*
2. *Enumerate the functions of the male and female reproductive systems;*
3. *Distinguish between the gonads of the two sexes, and between the internal and external genitalia.*
4. *Describe the anatomy of the male reproductive tract.*

The Endocrine System IV
Endocrine Disorders. Stress and Adaptation
Eicosanoids and Other Signaling Molecules
Max grade – 3

1. *Give a physiological definition of stress;*
2. *Discuss how the body adapts to stress through its endocrine and sympathetic nervous systems.*
3. *Explain what eicosanoids are and how they are produced;*
4. *Identify some classes and functions of eicosanoids;*
5. *Describe several physiological roles of prostaglandins*

Current control №2 --The Endocrine system
Max grade – 21

Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic **The Endocrine system**

Histology Reproductive System Male
Male reproductive system.
Max grade – 3

1. *Identify the structural elements of the organs of the male reproductive system in histological specimens.*
2. *Explain the features of spermatogenesis, the endocrine function of the testes,*
3. *Determine the tissue composition and layers of the vas deferens and additional organs of the male reproductive system.*
4. *Describe the microscopic anatomy of portion of the male urinary system.*

Histology Reproductive System II Female -1
Female reproductive system: structure and functions of the ovary, ovogenesis, fallopian tubes.

Max grade – 3

1. *Identify the structural elements of the organs of the female reproductive system in histological preparations.*
2. *Explain the features of ovogenesis. To master the endocrine functions of the ovaries.*
3. *Explain determine the tissue composition and membrane of the oviduct;*
4. *Define the microscopic anatomy of portion of the female urinary system*
5. *Describe the anatomy of the ovaries;*
6. *Describe the gross anatomy of the female reproductive tract;*
7. *Relate the process of egg production to the cyclic changes in the ovary and uterus;*
8. *Describe the production of eggs and how it is correlated with cyclic changes in the ovaries and uterus;*
9. *Describe the physiological processes that occur in the female during sexual intercourse.*

The male Reproductive system
Male Reproductive Anatomy

Max grade – 3

1. *Define explain why sexual reproduction in humans requires two different types of gametes;*
2. *Enumerate the functions of the male and female reproductive systems;*
3. *Distinguish between the gonads of the two sexes, and between the internal and external genitalia.*
4. *Describe the anatomy of the male reproductive tract.*

Female Reproductive Anatomy. Puberty and Menopause. Oogenesis and the Sexual Cycle. Female Sexual Response

Max grade – 3

1. *Describe the structure and function of the glands and other accessory organs of the female reproductive system;*
2. *Discuss female sexual development from puberty through menopause.*
3. *Menstruation Cycle*
4. *Female Sexual Response*

The Female Reproductive System III
Pregnancy and Childbirth Lactation
Current control №3

Max grade – 23

1. *Itemize the major hormones of pregnancy and describe their effects;*
2. *Describe the effects of pregnancy on a woman's body;*
3. *Explain what happens in each stage of childbirth;*
4. *Discuss the hormonal control of lactation;*
5. *Discuss the composition of colostrum and breast milk*
6. *Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic* ***The Reproductive system***

Human development- Embryology I
Human embryology

Sex cells. Early stages of development of the human embryo.

Max grade – 3

1. *Identify Sex cells. Early stages of development of the human embryo.*
2. *Define the microscopic anatomy of portion of the embrion.*

Human development- Embryology II
Human embryology Fertilization. Splitting up. Cleavage. Implantation
Max grade – 3

Human development- Embryology
Human embryology Gastrulation. Differentiation of germ layers, organogenesis.
Max grade – 3

1. *Describe a micrograph of the umbilical cord, fetal and maternal parts of the placenta.*
2. *Define and Identify embrions cells.*

Human embryology Extraembryonic organs – amnion, yolk sac, chorion, placenta, umbilical cord
Max grade – 3

Biophysics of nervous System Electrophysiology of Neurons Synapse Neural Integration
Max grade – 3

1. *Explain why a cell has an electrical charge difference (voltage) across its membrane;*
2. *Explain how stimulation of a neuron causes a local electrical response in its membrane;*
3. *Explain how local responses generate a nerve signal; explain how the nerve signal is conducted down an axon.*
4. *Explain how messages are transmitted from one neuron to another;*
5. *Give examples of neurotransmitters and neuromodulators and describe their actions;*
6. *Explain how stimulation of a postsynaptic cell is stopped*
7. *Explain how a neuron "decides" whether or not to generate action potentials;*
8. *Explain how the nervous system translates complex information into a simple code;*
9. *Explain how neurons work together in groups to process information and produce effective output;*
10. *Describe how memory works at the cellular and molecular levels.*

Current control №4 Embriology
Max grade – 23

1. *Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic* ***The Embryology***

Histology of Nervous System
Peripheral nervous system. The spinal cord.

Max grade – 3

1. *General structure of neurocytes is the body and processes.*
2. *Concept of functional polarization of neurocytes.*
3. *Morphological and functional classification of neurocytes.*
4. *Structure of two types of nerve fibers.*

5. *Describe the name the six types of cells that aid neurons, and state their respective functions;*
6. *Describe the myelin sheath that is found around certain nerve fibers, and explain its importance;*
7. *Describe the relationship of unmyelinated nerve fibers to their supportive cells;*
8. *Explain how damaged nerve fibers regenerate*.

Histology of nervous System II

Central nervous system. Brain. The cerebral cortex. Cerebellum. Overview of the Brain Meninges, Ventricles, Cerebrospinal Fluid, and Blood Supply
Max grade – 3

1. *Identify the organs of the nervous system and their tissue elements at the microscopic and ultramicroscopic levels.*
2. *Characterize the embryonic sources of development and the general laws of the structure, morphofunctional features of the organs of the nervous system.*
3. *Reproduce simple and complex reflex arcs typical of the somatic and autonomic nervous system, taking into account their characteristics at the organ and cellular levels.*

The Nervous System-The Spinal Cord I
The Spinal Cord The Spinal nerves

Max grade – 3

4. *Identify the parts of spinal cord in the model;*
5. *Identify the innervation of the spinal cord's branch;*
6. *State the three principal functions of the spinal cord;*
7. *Describe its gross and microscopic structure;*
8. *Trace the pathways followed by nerve signals traveling up and down the spinal cord.*
9. *Define describe the anatomy of nerves and ganglia in general;*
10. *Describe the attachments of a spinal nerve to the spinal cord;*
11. *Trace the branches of a spinal nerve distal to its attachments;*
12. *Name the five plexuses of spinal nerves and describe their general anatomy;*
13. *Name some major nerves that arise from each plexus;*
14. *Explain the relationship of dermatomes the spinal nerves.*
15. *Define reflex and explain how reflexes differ from other motor actions;*
16. *Describe the general components of a typical reflex arc;*
17. *Explain how the basic types of somatic reflexes function.*

Overview of the Brain Meninges, Ventricles, Cerebrospinal Fluid, and Blood Supply

Max grade – 3

1. *Recognize the central organs of the nervous system of their constituent tissue elements at the microscopic and ultramicroscopic levels.*
2. *Formulate an idea of the reflex activity of the cerebral cortex based on knowledge of its cyto- and myeloarchitectonics.*
3. *Properly describe the interneuronal connections of the cerebellar cortex.*
4. *Describe the major subdivisions and anatomical landmarks of the brain; describe the locations of its gray and white matter; identify the gray and white matter in the picture;*
5. *Describe the embryonic development of the CNS and relate this to adult brain anatomy; describe the meninges of the brain;*
6. *Describe the fluid-filled chambers within the brain;*

7. *Discuss the production, circulation, and function of the cerebrospinal fluid that fills these chambers;*
8. *Explain the significance of the brain barrier system.*

The nervous System
The Hindbrain and Midbrain The Forebrain

Max grade – 3

1. *List the components of the hindbrain and midbrain and their functions;*
2. *Describe the location and functions of the reticular formation.*
3. *Find and identify the Hindbrain and Midbrain in the model.*
4. *Name the three major components of the diencephalon and describe their locations and functions;*
5. *Identify the five lobes of the cerebrum in the model and their functions;*
6. *Describe the three types of tracts in the cerebral white matter;*
7. *Describe the location and functions of the basal nuclei and limbic system.*

The nervous System
Integrative Functions of the Brain

Max grade – 3

1. *List the types of brain waves and discuss their relationship to mental states;*
2. *Describe the stages of sleep, their relationship to the brain waves, and the neural mechanisms of sleep;*
3. *Identify the brain regions concerned with consciousness and thought, memory, emotion, sensation, motor control, and language;*
4. *Discuss the functional differences between the right and left cerebral hemispheres.*

Histology The Sensory Organs I
Organ of sight, organ of smell. Organs of hearing and balance, taste.

Max grade – 3

1. *Describe the microscopic anatomy of the ear,*
2. *Describe the microscopic anatomy of the the eye,*
3. *Describe the microscopic anatomy of the organ of taste*
4. *Describe the microscopic anatomy of the organ of smell.*

Current Control №5-
The Nervous System - BRAIN

Max grade – 20

Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic **The Nervous System and Sensory Organs**

Histology The Sensory Organs
Organ of sight, organ of smell. Organs of hearing and balance, taste.

Max grade – 14

1. *Describe the microscopic anatomy of the ear,*
2. *Describe the microscopic anatomy of the the eye,*
3. *Describe the microscopic anatomy of the organ of taste*
4. *Describe the microscopic anatomy of the organ of smell.*

Biophysics The laws of geometric optics.
Eye as an optical system

Max grade – 3

The nervous System - The Cranial Nerves I

Max grade – 3

1. *List the 12 cranial nerves by name and number;*
2. *Identify where each cranial nerve originates and terminates in the model and picture;*
3. *State the functions of each cranial nerve.*

The nervous System -The Autonomic Nervous System I
General Properties of the Autonomic Nervous System
Anatomy of the Autonomic Nervous System Autonomic Effects on Target Organs Central Control of Autonomic Function

Max grade – 3

1. *Explain how the autonomic and somatic nervous systems differ in form and function;*
2. *Explain how the two divisions of the autonomic nervous system differ in general function.*
3. *Identify the anatomical components and nerve pathways of the sympathetic and parasympathetic divisions in the picture;*
4. *Discuss the relationship of the adrenal glands to the sympathetic nervous system;*
5. *Describe the enteric nervous system of the digestive tract and explain its significance;*
6. *Name the neurotransmitters employed at different synapses of the ANS;*
7. *Name the receptors for these neurotransmitters and explain how they relate to autonomic effects;*
8. *Explain how the ANS controls many target organs through dual innervation;*
9. *Explain how control is exerted in the absence of dual innervation.*
10. *Describe how the autonomic nervous system is influenced by the central nervous system*

The nervous System -The Sensory Organs
Properties and Types of Sensory Receptors
The General Senses; The Chemical Senses

Max grade – 3

1. *Define receptor and sense organ; list the four kinds of information obtained from sensory receptors, and describe how the nervous system encodes each type; outline three ways of classifying receptors.*
2. *List several types of somatosensory receptors;*
3. *Describe the projection pathways for the general senses; explain the mechanisms of pain and the spinal blocking of pain signals;*
4. *Explain how taste and smell receptors are stimulated; identify in the picture;*
5. *Describe the receptors and projection pathways for these two senses.*

The nervous System -The Sensory Organs II
The Chemical Senses—Taste and Smell

Max grade – 3

1. *Describe the receptor cells for taste and smell and identify their anatomical locations;*
2. *Identify the five primary taste sensations and the chemicals that produce them;*
3. *Discuss factors other than taste that contribute to the flavor of food;*
4. *Identify the brain regions that process gustatory and olfactory information.*

The nervous System -The Sensory Organs
Eye and Vision

Max grade – 3

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

The nervous System -The Sensory Organs
Hearing and Equilibrium

Max grade – 3

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

Current Control №6
The Nervous System and Sensory Organs
Recap. Capstone - case

Max grade – 20

1. Demonstrate knowledge of normal anatomy and physiology (including histology) on the topic **The Nervous System and Sensory Organs**

Methodical instruction for tutorials

Aim: apply knowledge of morphology (anatomy and histology) and physiology of organs and systems of the human body (respiratory, cardiovascular, hematopoietic, digestive, urinary, reproductive, endocrine, musculoskeletal and skin as an organ, nervous, sensory organs) in age and the sexual aspect of human organ systems for understanding vital processes and maintaining homeostasis;

Learning outcomes:

1. *demonstrate knowledge of anatomy, topography and visualization in the age and sexual aspects of human organ systems;*
2. *be able to identify cellular and non-cellular structures that make up the tissues of organ systems on microscopic specimens with an understanding of their formation and function;*
3. *demonstrate knowledge of the physiological processes that determine the activity and mechanisms of regulation of human organs and systems (digestion, functioning of the senses);*
4. *understand and apply knowledge of the neuro-endocrine regulation of homeostasis, metabolism in different situations;*
5. *understand the processes and anatomical and physiological processes during pregnancy, development and growth, involutional changes, with various physiological stress variants;*
6. *demonstrate knowledge of the physiology of higher nervous activity and the cognitive process;*
7. *be able to conduct research on basic physiological functions;*
8. *demonstrate analytical skills in the integration of knowledge of the anatomy, histology and function of the human body to understand and evaluate normal life processes.*
9. *demonstrate the ability to identify learning gaps and create strategies to enhance one's own knowledge and skills.*
10. *communicate effectively with other students and teachers regarding medical and scientific information, articulate their opinions clearly when discussing the morphological structure and physiological processes, and work effectively as a member of the team.*

Work schedule:

1. Familiarize yourself with the basic and additional literature, use textbooks, the syllabus and present directions, Internet resources to prepare for seminars.
2. Be prepared for class and participate actively on case-discussion and problem solving group activities.
3. Use the examples (in this number cases and your own experience studied before) for illustration of theoretic material.
4. Use different tools for studying, discussion and visualisation of thoughts - drawing, mind maps, 3d-modelling.
5. Use the group work with cases for the development of teamwork skills, communication, problem solving and self-studying.

Rating for each topic:

Week/Lesson	Topic title	Max grade
1-1	Practical lesson 1 The lymphatic and immune system	3
1-2	Practical lesson 2 Fluid Balance Electrolyte Balance and Acid–Base Balance	3
1-3	Practical lesson 3 Histology of the Lymphatic System Cells of the lymphatic system, types of lymphatic tissue, red bone marrow, thymus, lymph nodes, tonsils, and spleen	3
2-1	Practical lesson 4 General Anatomy and Digestive Processes. The Mouth Through Esophagus. The Stomach.	3
2-2	Practical lesson 5 Liver. Gallbladder, pancreas. The Small Intestine and Large Intestine	3

2-3	Practical lesson 6 Histology of digestive system I Microscopic Anatomy of digestive organs and tissue II Topic: Digestive system. Pharynx, esophagus, stomach, small intestine, colon.	3
3-1	Practical lesson 7 Nutrition. Metabolic States and Metabolic Rate Body Heat and Thermoregulation	3
3-2	Practical lesson 8 Current Control 1	43
3-3	Practical lesson 9 Histology of digestive system II Microscopic Anatomy of digestive organs and tissue III Liver, pancreas	3
4-1	Practical lesson 10 Overview of the Endocrine system. The Hypothalamus and Pituitary Gland	3
4-2	Practical lesson 11 Other Endocrine glands.	3
4-3	Practical lesson 12 Histology of Endocrine System I Microscopic Anatomy of endocrine organs and tissue Endocrine system. Central endocrine system. Hypothalamus, pituitary, pineal gland.	3
5-1	Practical lesson 13 Hormones and Their Actions	3
5-2	Practical lesson 14 Histology of Endocrine System II Microscopic Anatomy of endocrine organs and tissue Peripheral endocrine system Adrenal gland, thyroid, parathyroid glands. CC №1	21
5-3	Practical lesson 15 Histology Reproductive System Sexual Reproduction and Development	3
	RK-1	100
6-1	Practical lesson 16 Endocrine Disorders. Stress and Adaptation Eicosanoids and Other Signaling Molecules	3
6-2	Practical lesson 17. Current Control 2	21
6-3	Practical lesson 18 Histology Reproductive System I Male Male reproductive system	3
7-1	Practical lesson 19 Histology Female reproductive system: structure and functions of the ovary, ovogenesis, fallopian tubes	3
7-2	Practical lesson 20 Male Reproductive Anatomy. Puberty, Hormonal Control, and Climacteric. Sperm and Semen. Male Sexual Response	3
8-1	Practical lesson 21 Female Reproductive Anatomy. Puberty and Menopause. Oogenesis and the Sexual Cycle. Female Sexual Response.	3
8-2	Practical lesson 22 Pregnancy and Childbirth. Lactation. CC №3 Reproductive	23
8-3	Practical lesson 23 Human embryology Sex cells. Early stages of development of the human embryo	3

9-1	Practical lesson 24 Human embryology Fertilization. Splitting up. Cleavage. Implantation	3
9-2	Practical lesson 25 Human embryology Gastrulation. Differentiation of germ layers, organogenesis.	3
9-3	Practical lesson 26 Human embryology Extraembryonic organs – amnion, yolk sac, chorion, placenta, umbilical cord	3
10-1	Practical lesson 27 Biophysics of nervous System Electrophysiology of Neurons Synapse Neural Integration	3
10-2	Practical lesson 28 Current control №4 Embryology	23
10-3	Practical lesson 29. Histology of Nervous System Peripheral nervous system The spinal cord	3
	Midterm	100
11-1	Practical lesson 30 Histology of nervous system Central nervous system. Brain. The cerebral cortex. Cerebellum. Overview of the Brain Meninges, Ventricles, Cerebrospinal Fluid, and Blood Supply	3
11-2	Practical lesson 31 The Spinal Cord. The Spinal nerves. Somatic Reflexes.	3
11-3	Practical lesson 32 Overview of the Brain Meninges, Ventricles, Cerebrospinal Fluid, and Blood Supply	3
12-1	Practical lesson 34 The Hindbrain and Midbrain. The Forebrain	3
12-2	Practical lesson 34 Integrative Functions of the Brain	3
12-3	Practical lesson 35 Histology The Sensory Organs Organ of sight, organ of smell. Organs of hearing and balance, taste.	3
13-1	Practical lesson 36 Current Control №5 Brain Spinal cord	19
13-2	Practical lesson 37 Histology The Sensory Organs Organ of sight, organ of smell. Organs of hearing and balance, taste. CC#2 of histology	13
13-3	Practical lesson 38 The laws of geometric optics. Eye as an optical system	3
14-1	Practical lesson 39 The Cranial Nerves	3
14-2	Practical lesson 40 General Properties and anatomy of the Autonomic Nervous System Autonomic Effects on Target Organs. Central Control of Autonomic Function	3
14-3	Practical lesson 41 Properties and Types of Sensory Receptors The General Senses;	3
15-1	Practical lesson 42 The Chemical Senses. Taste and Smell.	3
15-2	Practical lesson 43. Eye and Vision.	3
15-3	Practical lesson 44. Hearing and Equilibrium	3

15-4	Practical lesson 45 Current control №6 Cranial nerves. Sense organs. Recap. Capstone - case	19
IWS with teacher	Independent work of the student with the teacher – presentation of Independent work of the student#2	10
	RK2	100
	Total	300

SOME TIPS ON TEAMWORK AND LEARNING

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 an essential component in the practical exercises of our course. In addition, it aims to provide a safe environment in which you can try out new ideas and practices and acquire relevant group skills. These can be tasks for performance in pairs, triples or small groups of 4-6 people (work with cases, tasks of the ISW, etc.).

When you are working on a project or task in a team, you have the opportunity to use the various strengths of the group members to create a wider and better project or task than if you were working independently.

Group training means 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, 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 group mates. The better you know each other and the more convenient you communicate, the more effective you can work together.

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

For effective communication and discussion in a team: you should not be shy to express your opinion and it is important to feel that these opinions will be heard; it is necessary to feel that all members of the group make a feasible contribution to solving problems, observing agreed rules and plans, performing work efficiently and on time; it is important to know that everyone's feelings are taken into account by team members, but the goals and objectives of the group are not compromised, 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. When you disagree, be constructive and focus on the problem, not the person. Similarly, when someone disagrees with you, respect what he says and the risk that he takes upon himself to express his opinion. Try to find a way that everyone can agree with, and this is not necessarily the opinion of the loudest or smartest member of the team.

Below we provide some examples of constructive and destructive group behavior

Constructive group behavior - a person who:

Unites - interest in the views and opinions of others and willingness to adapt to interest

Clarifies - clearly defines the problems for the group by listening, summarizing, focusing the discussion

Inspires - encourages the group, stimulates participation and progress

Harmonizes - stimulates group unity and teamwork. For example, uses humor as a relaxation after difficult situations.
Take the risk - willingness to take risks at the expense of oneself for the success of the group or project
Manages the process - organizes a group on the issues of the process: for example, plan, schedule, timeline, topic, solution methods, and use of information

Destructive group behavior:

Domination - takes a lot of time expressing your opinion and views. Trying to take control by capturing energy, time, etc.
Fussiness - hastens the group to move quickly before the task is completed. Impatient in listening to other opinions and working together.
Suspension - removes itself from a discussion or decision. Opt out
Ignoring - does not respect or belittle the ideas and suggestions of the team or individuals. An extreme manifestation of ignoring is an insult in the form of ridicule.
Distraction - excessive talkativeness, tells stories and leads groups away from the goal
Blocking - prevents group progress by denying all ideas and suggestions. "It will not work because ..."

Effective group work does not arise by itself. A conscious and planned effort is needed, and since many people participate in it, one cannot rely on memory; need to make notes. **The following steps** will help you and your team work together effectively.

1. Define clear objectives. At each stage, you should try to coordinate the tasks. They include a timeline for the project, as well as more specific tasks (such as "agree on an approach to the task before Friday"). Each meeting or discussion should also begin with a specific goal (for example, make a list of tasks that need to be completed). Tasks should be broken down into smaller parts and planned. Sometimes one part cannot be started until the other part is finished, so you may need to draw a simple temporary map.

· discuss the resources that you have and those that you will need to find.
· formulate the desired result.
· consider how you know when you did it well enough?
· split tasks between the team and
· set deadlines for subtasks and time for future meetings.

2. Set the basic rules. Discussions can become erratic and can prevent more modest group members from participating if you do not have rules to stimulate discussion, resolve disagreements, and make decisions without repetition. Set the rules from the start and change them as needed. For example: an interesting rule that was developed by one group - anyone who missed a meeting would buy the rest of the group coffee in a coffee shop. No one ever missed a meeting after that.

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

4. Find consensus. People work together most effectively when they work towards a goal with which they have agreed. 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 the roles. Divide the work that needs to be done into separate tasks, for which you can use the strengths of individual team members. Define roles for both fulfilling your tasks and for meetings / discussions (for example, Arani is responsible for summarizing the discussions, Joseph is for everyone to express their opinions and make decisions, etc.).

Examples of roles and functions:

Facilitator or *leader* (depending on 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 respected.

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

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

Controller - to ensure that work is completed by an agreed time, and to solve problems if they are not being performed.

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

Editor - bring all materials together, identify gaps or matches and ensure consistency in the final presentation.

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

7. Keep good notes. Always summarize the discussions and document the decisions and publish them (for example in WhatsApp chat) so you can always get back to them. This includes lists of those who agreed what to do.

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 exactly in this way, not in the way you would like. If you think the plan should be reviewed, discuss it.

9. Keep track of progress and keep up to date. Discuss progress together regarding your schedule and deadlines. Make sure you meet deadlines personally so you do not 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 separate the work of writing, comparing, editing, and finalizing your work. Writing in a group (six people crowd around the keyboard) is a recipe for conflict and lack of progress. The other extreme - when one person assumes all responsibility and ultimately does most of the work - is also unproductive and contributes to conflict.

Three approaches are possible when working on a common document:

1 - One person writes the most part - this means that a narrow circle 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 know about the rest, except for your own section.

3- Co-writing. This is the most productive way to solve group problems and provides the greatest benefit from collaboration. For example: in each section, there is a writer and at least one reviewer, and each team member is the author of a section and a reviewer of another one.

All team members before finalization by **the editor** must review the final product. Alternatively, you can have one author with others, editors, add and review, and someone tidies the finished report.

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

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

- Is the purpose of the project clear from the report?
- Are the conclusions or recommendations clear?
- Do conclusions follow from the main part of the report?
- Do sections fit well?
- Does the report achieve goals (and evaluation criteria)?
- Are the necessary components sufficiently covered?

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

Monitoring team performance and coping

Below is a checklist that includes a list of common problems that arise in a group work. Use it regularly to identify problems before they get out of hand. If serious problems and tensions arise, use it to determine where something might go wrong. First answer each question about yourself, and then give answer to this **question** about the group as a whole. Then gather a group and discuss where, in your opinion, problems may arise, and think about how you can overcome these problems.

Each participant must complete this checklist. You should do this exercise regularly to track and improve your team's performance.

1. Answer each question regarding your teamwork.
2. Answer each question regarding the rest of the team.
3. Get together with your entire team and discuss where, in your opinion, any problems arise.
4. Discuss what you are going to do to overcome these problems.

Checklist for self-assessment of team effectiveness.

You	I personally	Group as a whole	Comments
Effectively clarify your tasks and tasks at each stage?			
Evaluate the progress of work?			
We clarify and document everything that the group decided?			
We clarify who will do what and how?			
We clarify by what date each task should be done?			
Setting meeting management rules?			
Adhere to agreed rules?			
Listening to each other?			
Allow some team members to dominate?			
Allow some team members to refuse / withdraw?			
We sacrifice personal desires for the success of the team?			
Recognize the feelings of other team members?			
Making equal contributions to team progress?			

Adhere to agreed rules for writing and naming files?			

Points and Grade

Group tasks and assignments mean that grades are given to the whole group based on the results of the work of the whole group. Everyone should be interested in ensuring the effective contribution of all members of the group and ensuring the high quality of the assignment. Sometimes, to assess the relative contribution of each to the group process, a form of peer-to-peer or peer review and a team assessment form will be used. This can be used to moderate assignment grades, or simply as a way to give feedback on your work in a group. The following are examples of student assessment criteria for team training.

№	**Student assessment criteria in practical classes**
1	*Preparation for classes:* He studies information focused on the case and problematic issues, uses various sources, and supports the statements with relevant links.
2	*Group skills and professional attitude:* Demonstrates excellent attendance, reliability, responsibility Takes the initiative, takes an active part in the discussion, helps the teammates, willingly takes on tasks
3	*Communication skills:* Actively listens, shows emotions according to the situation, is susceptible to non-verbal and emotional signals, shows respect and correctness in relation to others, helps to resolve misunderstandings and conflicts
4	*Feedback Skills:* Demonstrates a high level of introspection, critically evaluates oneself and colleagues, provides constructive and objective feedback in a friendly manner, accepts feedback without opposition
5	*Skills of critical thinking and effective learning:* Effectively participates in generating hypotheses and formulating problematic questions, gives relevant examples from life, skillfully applies knowledge to the problem / case under consideration, critically evaluates information, draws conclusions, explains and substantiates statements, draws diagrams and drawings, demonstrates a 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 the questions posed without redundancy; integration of theoretical issues; Use of relevant examples proper use of professional terminology

Basic literature:

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

Additional literature:

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

Online resources:

1. https://app.lecturio.com/#/
2. https://3d4medical.com/
3. https://www.youtube.com/channel/UCc_I2c2bUtO0p4DVeo6-Kxg
4. https://sites.google.com/a/umich.edu/bluelink/curricula/anatomy-403?authuser=0
5. https://histologyknmu.wixsite.com/info/gistologicheskie-sajty

6. http://www.histology-world.com/contents/contents.htm
7. http://www.histologyguide.com/slidebox/02-epithelium.html
8. https://histology.medicine.umich.edu/resources
9. https://web.duke.edu/histology/
10. http://virtualslides.med.umich.edu/Histology/view.apml?listview=1&