

**ANNOTATION OF THE WORK PROGRAM,  
including adapted  
DISCIPLINES “Normal physiology”**

Direction of training (specialty): **05.31.01**

Name of profile (specialization): **General medicine**

Higher education level: **specialty**

Graduate qualification: **medical doctor**

Faculty: **of Medicine**

Department: **of Normal Physiology**

The educational form: **full-time**

**1. PURPOSE AND OBJECTIVES OF MASTERING THE DISCIPLINE**

**The goal** is to develop students' systematic knowledge about the vital activity of the whole organism and its individual parts, about the basic laws of functioning and mechanisms of their regulation, about the physiological foundations of clinical and physiological research methods used in functional diagnostics and in the study of integrative human activity, as well as to teach them the skills of studying various physiological processes and functions, including through the use of information and communication technologies (ICT), develop the ability and readiness to perform professional tasks using digital tools.

**Tasks:**

- formation of students' skills in analyzing the functions of an integral organism from the perspective of integral physiology and analytical methodology;
- formation of students' systematic approach to understanding the physiological mechanisms underlying the interaction with environmental factors and the implementation of adaptive strategies of the human and animal bodies, the implementation of normal functions of the human body from the perspective of the concept of functional systems;
- teaching students the methods and principles of studying the assessment of the state of regulatory and homeostatic systems of the body in an experiment, taking into account their applicability in clinical practice;
- teaching students the laws of functioning of various systems of the human body and the features of intersystem interactions in the context of performing purposeful activities from the perspective of the theory of adaptation and cross-adaptation;
- teaching students methods for assessing the functional state of a person, the state of regulatory and homeostatic systems in various types of purposeful activities;

- teaching students the role of higher nervous activity in the regulation of human physiological functions and purposeful management of the body's reserve capabilities under normal and pathological conditions;

- introduce to students basic principles of modeling physiological processes and existing computer models (including feedback) for studying and purposefully managing visceral functions of the body;

- formation of students ' fundamentals of clinical thinking based on the analysis of the nature and structure of inter-organ and intersystem relations with the position of integral physiology for future professional activity.

## 2. RESULTS EXPECTED AFTER STUDYING THE DISCIPLINE

### Competences formed during studying the academic discipline:

Code and name of the competence (or its part)	Code and name of the competence achievement indicator
<i>General professional competencies (GPC)</i>	
GPC-5: ability to assess morphofunctional, physiological conditions and pathological processes in the human body for solving professional tasks	A11 GPC-5- evaluates morphofunctional processes in physiological conditions
<p><b>Know:</b></p> <ul style="list-style-type: none"> <li>* excitability and its parameters;</li> <li>* membrane-ion theory of the origin of biopotentials;</li> <li>* classification of nerve fibers.</li> <li>* polar effect of constant on excitable tissues;</li> <li>* laws of irritation and patterns of conducting excitation along nerve fibers;</li> <li>* importance of recording biopotentials in medicine (EMG, ECG, EEG);</li> <li>* structure and functions of the myoneural synapse;</li> <li>* the structure of muscle fibers, sarcomeres;</li> <li>* modern theory of the mechanism of muscle contraction ("theory of sliding threads" by H. Huxley and E. Huxley);</li> <li>* strength, work and muscle fatigue;</li> <li>* morpo-functional classification of neurons.</li> <li>* principles of feedback in the central nervous system;</li> <li>* types of CNS synapses and classification of mediators;</li> <li>* the nature of exciting postsynaptic potential and Inhibitory postsynaptic potential;</li> <li>* functional characteristics of various departments of the central nervous system. The nature of spinal shock;</li> <li>* vital centers of the medulla oblongata;</li> <li>* mechanisms of functioning and principles of regulation of endocrine cells and endocrine glands;</li> <li>* types and mechanisms of action of hormones;</li> <li>* hypothalamic-pituitary neuroendocrine regulation of physiological functions;</li> <li>* features of their interaction in conditions of purposeful behavior and pathology;</li> <li>* the blood system and its role in maintaining and regulating the body's homeostatic constants, blood function;</li> <li>* characteristics and functional features of physiological blood constants;</li> <li>* rules of blood transfusion;</li> <li>* the value of the biological sample during blood transfusion;</li> </ul>	

- \* hemostatic processes and current understanding of blood clotting mechanisms;
- \* basic properties of the heart muscle;
- \* cavities and valvular apparatus of the heart;
- \* main mechanisms of regulation of heart activity, cardiac cycle;
- \* physiological role of the vascular system, regulation of vascular tone and systemic hemodynamics;
- \* the relationship between volumetric blood flow and linear velocity at rest and physical exertion;
- \* mechanisms of filtration and reabsorption at the level of the microcirculatory bed and their regulation;
- \* neuro-humoral regulation of vascular tone;
- \* ventilation of the lungs, lung volumes and capacities;
- \* regulation of respiration, features of respiration in various conditions of existence;
- \* digestion as a process necessary for the realization of energy and plastic functions of the body;
- \* Pavlov experiments on the physiology of digestion;
- \* features of functioning of various departments of the gastrointestinal tract. Digestive and non-digestive functions of the gastrointestinal tract;
- \* mechanisms of hunger and satiety;
- \* methods of investigation of the digestive system;
- \* basic processes and mechanisms of maintaining a constant body temperature;
- \* the main stages of urine formation and mechanisms of their regulation;
- \* the principle of operation of the "Artificial kidney" device;
- \* basic non-excretory (homeostatic) kidney functions;
- \* the main morpho-functional features of the organization of various departments of sensory systems;
- \* theories of color perception, perception of sound vibrations, and visual refractive errors.
- \* types of higher nervous activity according to Hippocrates and I. P. Pavlov;
- \* mechanisms of memory, sleep phases, and cortical rhythms.

**Be able to:**

- prepare a neuromuscular preparation;
- determine the time of the Turk reflex;
- to reproduce the experience of I. M. Sechenov's central braking;
- determine blood types.
- determine ESR by Panchenkov;
- determine the amount of blood hemoglobin by the Sali method;
- interpret the general blood count and leukocyte formula;
- determine the Rh factor; determine the specific gravity of urine (urometry);
- conduct and analyze an ECG;
- analyze your heart rate.
- perform Stange and Gench spirometry and breath tests;
- calculate the basal metabolic rate using the table and the Harris-Benedict formula, approximate formula, and body surface data;
- calculate the specific dynamic effect of food using the formula;
- calculate the student's food intake.
- perform olfactometry.
- perform a density measurement.
- perform esthesiometry.
- reproduce Galvani's experiments;
- to study the tendon reflexes in humans (knee, achilles, etc.);

- examine samples for detection of cerebellar ataxia (Romberg, finger-nose, knee-heel);
- examine orthostatic and clinostatic samples.

**Posses:**

- the technique of preparing a neuromuscular preparation of frogs;
- the method of determining the time of the reflex according to the Turk;
- a method for determining muscle strength (using hand and stanovoy dynamometers);
- a method for determining blood groups and Rh factor using soliklons;
- a method for determining blood pressure.
- palpation and counting of arterial pulse;
- техникой проведения pulse oximetry techniques;
- the method of calculating personal income tax.
- the method of determining the eye-heart reflex of Ashner;
- techniques for determining visual acuity and fields of view.
- method for determining color perception.
- technique for calculating the number of red blood cells and white blood cells;
- determination of blood clotting time, ESR, and hemoglobin content;
- methodology for assessing the osmotic stability of red blood cells;
- methodology for evaluating the results of a general urinalysis;
- methodology for determining the types of HNA (Eysenck test).

### 3. PLACE OF THE DISCIPLINE (MODULE) IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM

The discipline "Normal physiology" belongs to the basic part B1 of the curriculum for the specialty 31.05.01 Medical Science.

The course material is based on students' previously acquired knowledge and skills in biology, cytology, chemistry, physics, histology, embryology, biochemistry, anatomy, Latin language, physical culture and sports.

The study of the discipline "Normal Physiology" is aimed at developing the following general professional and professional competencies in students: GPC-5 - Is able to assess morphofunctional, physiological states and pathological processes in the human body to solve professional problems.

To master this competence, it is necessary to know the mechanisms of functioning of the body in normal conditions and under the influence of environmental factors, reflexes, physical and chemical properties of blood plasma, structural and functional features of blood, organs of the respiratory system, excretion, digestion, and other systems of the human body.

**"Competence"**

There is a specific competence of GPC-5 "Able to assess morphofunctional, physiological and pathological processes in the human body to solve professional problems" AI1 / GPC-5

#### Sections of the discipline "Normal physiology"

№	Section names
1	Introduction to the subject. Physiology of excitable tissues
2	General and private neurophysiology. The autonomic nervous system
3	Physiology of the endocrine system
4	Physiology of the blood system
5	Physiology of the cardiovascular system
6	Respiratory physiology
7	Physiology of digestion
8	Physiology of metabolism and energy
9	Physiology of nutrition and thermoregulation
10	Physiology of the excretory system
11	Physiology of analyzers
12	Physiology of higher nervous activity

### Interdisciplinary relations with following disciplines

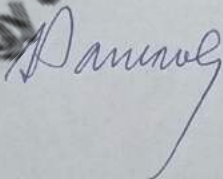
n/n	Name of the provided (subsequent) disciplines	1	2	3	4	5	6	7	8	9	10	11	12
1	Propaedeutics of internal diseases				+	+	+	+	+	+	+		
2	Ophthalmology		+									+	+
3	Otorhinolaryngology		+				+	+				+	+
4	Obstetrics and Gynecology				+	+	+						
5	Pediatrics		+	+	+	+	+		+	+			+
6	Neurology, medical genetics, neurosurgery	+	+	+								+	+
7	Psychiatry, medical psychology												+
8	Forensic medicine				+		+	+					
9	Medical rehabilitation	+	+	+		+	+					+	+
10	Hospital therapy			+	+	+	+	+	+	+	+		
	Faculty therapy			+	+	+	+	+	+	+	+		
11	Immunology				+	+	+	+					
12	Phthisiology						+						
13	General Surgery		+		+		+		+	+			+
14	Anaesthesiology, intensive care, intensive care		+		+	+	+			+	+		
15	Faculty Surgery			+			+	+					
16	Hospital surgery			+			+	+					
19	Dentistry						+	+				+	
20	Hygiene						+	+	+	+			
21	Radiation diagnostics												
22	Endocrinology		+	+		+	+	+	+	+	+		
23	Urology										+		

#### 4. SCOPE OF THE DISCIPLINE AND TYPES OF ACADEMIC WORK

The total labor intensity of the discipline is 8 credits.

Types of work		Total hours	Number of hours in semesters	
			III	IV
1		2	3	4
<b>Contact work (total), including:</b>		<b>160</b>	<b>64</b>	<b>96</b>
<b>Classroom work</b>				
Lectures (L)		44	16	28
Practical exercises (PE),		110	48	68
Seminars (S)				
Laboratory work (LW)				
Extracurricular activities				
<b>Independent work of a student (IWS)</b>		92	44	48
Type of intermediate certification	Exam (E)	36		36
TOTAL:	hours	288	108	180
overall labor intensity	Credit units	8	3	5

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