Federal State Budgetary Educational Institution of Higher Education

"Privolzhsky Research Medical University"

Ministry of Health of the Russian Federation

APPROVED

Vice-Rector for Academic Affairs

E.S. Bogomolova

31 August 2021

WORKING PROGRAM

Name of the academic discipline: **NORMAL PHYSIOLOGY, PHYSIOLOGY OF THE MAXILLO-FACIAL REGION**

Specialty: **31.05.03 Dentistry**

(code, name)

Qualification: **DENTIST**

Department: **DEPARTMENT OF NORMAL PHYSIOLOGY NAMED AFTER N.YU. BELENKOV**

Mode of study: **ULL-TIME**

Labor intensity of the academic discipline: **144 academic hours**

Nizhny Novgorod

2021

The working program has been developed in accordance with the Federal State Educational Standard of Higher Education in the qualification 31.05.03 "Dentistry", approved by Order of the Ministry of Science and Higher Education of the Russian Federation No. 984 dated August 12, 2020.

Developers of the working program:
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The work program was reviewed and approved at the Normal Physiology Department meeting, August, 29th, 2021 (protocol No. 1)

Head of the Normal Physiology Department
named after N.Yu. Belenkov, PhD, DrSci, Prof _____ Mukhina I.V.
(signature)

August, 29th, 2021

AGREED
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(signature)

August, 29th, 2021

1. The purpose and objectives of mastering the discipline "Normal physiology, physiology of the maxillofacial region"

1.1. The purpose of mastering the discipline is participation in the formation of competencies UC-1 and GPC-9.

1. 2. Objectives of the discipline:

As a result of mastering the discipline, the student has to:

Know:

• Physiological terms;

• General physiological patterns underlying the processes occurring in the human body;

• Physiological processes occurring in human organs and systems, their self-regulation under the influence of factors of the internal and external environment;

• Methods of functional and laboratory diagnostics (electrocardiography - ECG, methods for studying pulse and blood pressure, spirometry, spirography, pneumography, coagulography, determination of the blood group according to the ABO system and the Rh factor, gustometry, gnatodynamometry, electromyomasticography), methods of experimental work.

• Principles of analysis and evaluation of physiological processes occurring in human organs and systems, results of functional and laboratory diagnostic analysis methods, results of experimental work.

Be able to:

• Apply physiological terms in professional activities;

• Analyze and evaluate the functional state of various cellular, tissue and organ structures;

• Interpret the results of laboratory and functional diagnostic methods (electrocardiography - ECG, methods for studying pulse and blood pressure, spirometry, spirography, pneumography, coagulography, determination of the blood group according to the ABO system and the Rh factor, gustometry, gnatodynamometry, electromyomasticsography);

• Perform practical work under the guidance of a teacher; analyze and evaluate the results of practical work, draw conclusions that correspond to the goal and the results of the experiments.

Possess:

• The skills of independent measurement of arterial pressure and pulse palpation;

• The skills of independent use of the physiological conceptual apparatus.

2. Position of the academic discipline in the structure of the General Educational Program of Higher Education (GEP HE) of the organization.

2.1. The discipline "Normal physiology, physiology of the maxillofacial region" (B1.O.16) refers to the core part of Block 1 (B.1.O) of the "Disciplines" of the general educational program of higher education. The discipline is studied in the second and third semesters.

2.2. The following knowledge, skills and abilities formed by previous academic disciplines are required for mastering the discipline:

Latin, philosophy, bioethics, history of medicine, psychology and pedagogy, physics, mathematics, medical informatics, biology, chemistry, biological chemistry - biochemistry of the oral cavity, human anatomy - anatomy head and neck, histology, embryology, histology, histology of the oral cavity are required.

2.3. Mastering the discipline is required for forming the following knowledge, skills and abilities for subsequent academic disciplines: pathophysiology, pathophysiology of the head and neck, pharmacology, internal diseases, neurology; psychiatry and narcology, otorhinolaryngology; ophthalmology, general surgery, surgical diseases, dentistry.

3. Deliverables of mastering the academic discipline and metrics of competence acquisition

Mastering the discipline aims at acquiring the following universal (UC) and general professional (GPC) competencies:

No.	Competence code	The content of the competence (or its part)	Code and name of the competence acquisition metric	As a result of studying the discipline, students should:		
				Know	Be able to	Possess
1.	UC -1	Able to carry out a critical analysis of problematic situations based on a systematic approach, develop an action strategy	IUC 1.1 Knows: methods of critical analysis and evaluation of modern scientific achievements; basic principles of critical analysis IUC 1.2 Able to: gain new knowledge based on analysis, synthesis, etc.; collect data on complex scientific problems related to the professional field; search for information and solutions based on action, experiment and experience. IUC 1.3 Has practical experience: researching the problem of professional activity using analysis, synthesis and other methods of intellectual activity; developing an action strategy to solve professional problems	Principles of analysis and evaluation of physiological processes occurring in human organs and systems; Principles of analysis and evaluation of the functional systems of the human body and their self-regulation under the influence of factors of the internal and external environment; Principles of analysis and evaluation of the results of functional and laboratory diagnostic methods (electrocardiography - ECG, methods for studying pulse and blood pressure, spirometry, spirography, pneumography, coagulography, determination of the blood group according to the ABO system and the Rh factor, densometry, gnatodynamometry, electromyomastikatsiography); Principles of analysis and evaluation of the results of experimental work. Analyze the results of experimental work, draw conclusions that correspond to the goal and the results of the experiments.	Analyze the functional state of various cellular structures, tissues and organs, substantiate their point of view on the basis of evidence-based medicine; Interpret the results of laboratory and functional diagnostic methods; Analyze the results of practical works, draw conclusions corresponding to the goal and the results of the experiments.	Skills of blood pressure measurement and pulse palpation; Medico-physiological conceptual apparatus.
2.	GPC-9	Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional	IGPC-9.1 Knows: anatomy, histology, embryology, topographic anatomy, physiology, pathological anatomy and physiology of	Physiological terms; General physiological properties of cells and tissues; General physiological patterns underlying the processes occurring in the human body; Physiological processes	Analyze the functional state of various organs, including the maxillofacial region; Interpret the results of laboratory and functional diagnostic methods;	Medico-physiological conceptual apparatus; Methods for measuring blood pressure and pulse palpation.

		problems.	human organs and systems IGPC-9.2 Is able to: assess the basic morphofunctional data, physiological conditions and pathological processes in the human body.	occurring in human organs and systems; Patterns of functioning of the maxillofacial region organs and their interaction with other body systems; Functional system of food bolus formation; Methods of functional and laboratory diagnostics (ECG, methods for studying pulse and blood pressure, spirometry, spirography, pneumography, coagulography, determination of the blood group according to the ABO system and the Rh factor, gustometry, gnatodynamometry, electromyomasticaciography);	Perform practical work under the guidance of a teacher; Analyze the results of experimental work, draw conclusions that correspond to the goal and the results of the experiments.	

4. Sections of the discipline and competencies that are formed when mastering them:

No.	Competence code	Section name of the discipline	The content of the section in teaching units
1.	UC -1 GPC-9	Introduction to the subject. Basic concepts of physiology. Regulation of physiological functions.	Normal physiology is a science that studies the life processes of a healthy organism. The concept of physiological function. The concept of physiological functions' regulation. Basic principles, levels and mechanisms of functions' regulation. The concept of physiological constants. Concepts of homeostasis, homeokinesis. Functional system as a mechanism for self-regulation of homeostasis. The concept of a functional element (A.M. Chernukh). Functional elements of the dental system.
2.	UC -1 GPC-9	Physiology of excitable systems.	he history of the biocurrents discovery (experiments of Galvani, Matteuchi). Quiescent currents and action currents. Membrane resting potential, the mechanism of its origin. Action potential, its phases and their electrogenesis. Excitability, conductivity, lability as the main physiological properties of highly specialised biosystems (nervous, muscular and glandular tissues). Measures of excitability, conductivity and lability. Fluctuations of membrane excitability during excitation. Refractoriness and exaltation. Excitation as a response of an excitable biosystem. Conditions for excitation occurrence. Electrical phenomena in the oral cavity. Physiological properties of skeletal muscles. The mechanism of muscle contraction, the role of the action potential in the development of muscle contraction. Types of muscle contractions depending on the contraction conditions. Types of muscle contractions depending on the frequency of stimulation. The concept of a motor unit. Types of nerve fibers and their physiological properties. The mechanism and features of the excitation conduction along myelinated and unmyelinated nerve fibers. Patterns of excitation conduction along the nerve.
3.	UC -1 GPC-9	Physiology of the central nervous system (CNS).	CNS functions. The reflex as a basis for the central nervous system activity. The reflex arc of the somatic reflex. Morphofunctional organization of a neuron as a unit of the nervous system. Physiology of the synapse. Synapse classification. Functional properties of a chemical synapse and mechanism of synaptic

			transmission. Nerve centers and their properties. Basic principles of the excitation propagation along the reflex arc. Inhibition in the CNS. Significance of inhibition in the adaptive activity of the body. (I.M. Sechenov). The role of inhibition in CNS activity. Mechanisms and types of central inhibition. Principles of the central nervous system activity coordination. Autonomic (vegetative) nervous system, its functions. Differences between the somatic and autonomic nervous systems. Features of the sympathetic and parasympathetic divisions of the autonomic nervous system.
4	UC -1 GPC-9	Physiology of sensory systems. Sensory function of the oral cavity.	The concept of a sensory system, their functions. General principles of the sensory systems' structure. Peripheral (receptory) part of the sensory system. Classification of receptors. Functional properties and functions of receptors. Adaptation of receptors, methods of its study. Visual sensory system. The concept of refraction and accommodation of the eye. Photochemical processes in the receptors of the retina. Auditory sensory system. Sound-catching formations, sound-conducting paths and sound-perceiving apparatus of the auditory sensory system. Mechanisms of sound reception. Olfactory sensory system. Structural and functional characteristics of the receptor, conductor, central compartmens of the olfactory sensory system. Taste. Taste receptors. Taste buds. Types of taste buds of the tongue. Mechanism of taste perception. Methods for studying the taste sensory system. Gustometry and functional mobility. Sensory function of the oral cavity, its features. Gradients of various types of sensitivity in the oral cavity. The role of the interaction of gustatory, olfactory and other sensory systems in the formation of taste sensations. The role of afferentation from oral cavity receptors in the formation of ascending activating influences on various parts of the central nervous system. Adjustment of the activity of various sections of the digestive tract by afferent influences from the receptors of the oral cavity. Viscerolingual relations (gastrolingual reflex). Taste perception in various types of purposeful activity. The concept of pain, nociception. Pain functions. Pain classification. Pain as an integrative response of the body to the damaging effects of a stimulus. Components of the pain reaction. Morpho-functional characteristics of the pain sensory system divisions. The role of the thalamus and the cerebral cortex in the integration and analysis of pain. Sensory-discriminative and semantic analysis of damaging effects. Concepts of antinociception and antinociceptive system (ANCS). Components and functions of ANCS. ANCS levels: system of descending inhibitory control of primary afferents and first relay nuclei; limbic-hypothalamic level; cortical level (secondary somatosensory and orbito-frontal areas of the cerebral cortex). Neurochemical and neurophysiological mechanisms of ANCS. The concept of pain threshold. Algometry. Physiological bases of anesthesia in dentistry.
5	UC -1 GPC-9	Physiology of higher nervous activity.	The concept of higher nervous activity, its manifestations (instincts, conditioned reflexes, mental processes, behavior). Conditioned reflex. Comparative characteristics of conditioned and unconditioned reflexes. Rules and stages of conditioned reflexes formation. Classification of conditioned reflexes. The formation of a temporary connection as the basis for the development of a conditioned reflex. Inhibition in higher nervous activity. Types of higher nervous activity, their classification and characteristics.
6	UC -1 GPC-9	Physiology of the endocrine system.	Structural and functional organization of the endocrine system. Endocrine glands. The role of endocrine glands in the development and formation of organs of the maxillofacial region. The hypothalamic-pituitary system. Self-regulation of the endocrine glands.
7	UC -1 GPC-9	Physiology of blood.	The concept of the internal environment of the body and its components. Functions of the blood. Formed elements of blood, their significance. Hemoglobin, its compounds, functional significance. The hematological parameters (variable and

			non-variable). The concept of the protective function of blood and its manifestations (immune reactions, hemostasis). Hemostasis, its phases. Factors involved in the process of blood coagulation. Coagulation, anticoagulation and fibrinolytic blood systems as the main reaction apparatus of the functional system that maintains the liquid state of the blood. Factors accelerating and slowing down blood coagulation. Immune functions of the oral cavity. Protective role of the oral hemostasis system. Blood groups as manifestations of the body's immune specificity. Varieties of blood group systems (AB0, Rhesus). Physiological bases of blood transfusion, their importance for surgical practice.
8	UC -1 GPC-9	Physiology of circulation.	Circulatory system. Heart, its functions. Physiological properties of the heart: automaticity, excitability, conductivity and contractility. Automaticity, its substrate, gradient of automaticity. Excitability of the heart, absolute refractoriness. Signal transmission in myocardial cells. Features of excitation conduction in various areas of the heart. The concept of functional syncytium for the heart. Features of contractility of the heart in comparison with skeletal muscles. The concept of the cardiac cycle. Electrocardiography, its significance. Registration and analysis of ECG. Types of cardiac activity regulation: humoral, nervous and hemodynamic mechanisms. Features of the action of the sympathetic and parasympathetic divisions of the autonomic nervous system on the heart activity. Functional classification of blood vessels. Parameters of peripheral circulation (blood pressure, linear and volumetric blood flow velocities, blood circulation time). Systolic, diastolic, and pulse blood pressure. Factors determining blood pressure. Measurement of arterial blood pressure (auscultative and palpatory methods). Arterial pulse. Sphygmography. Rheography. Clinical and physiological assessment of the pulse in humans. Vascular tone. The concept of the vascular tone regulation: myogenic, nervous and humoral mechanisms. Vasomotor center, its pressor and depressor departments. Microcirculation. Features of microcirculation in the organs of the maxillofacial region. Regulation of blood circulation in the organs of the maxillofacial region.
9	UC -1 GPC-9	Physiology of respiration. Respiratory and communicative functions of the oral cavity.	The importance of respiration. The main stages of respiration. External respiration and its indicators. Methods for studying external respiration (spirometry, spirography). Gas exchange in the lungs. Gas exchange in tissues. Oxygen delivery by the blood. Transport of carbon dioxide by the blood. Respiratory center, its compartments. Mechanism of switch in respiration phases. Protective respiratory reflexes. Nasal and oral breathing, their features. Functional connection of the processes of breathing, chewing and swallowing. Speech breathing. Speech, its types and functions. Active and passive organs involved in sound production. Characteristics of the departments of speech formation. The concept of phoneme, phonation and articulation. Phonation mechanism. The importance of the oral cavity organs in the phonation and speech formation.
10	UK -1 GPC-9	Physiology of digestion. Digestive function of the oral cavity	Digestion, its role, types and forms. Digestive functions of the gastrointestinal tract: secretory, motor and absorption. Digestive tract, features of its organization and functioning. General principles of neuro-humoral regulation of the digestive tract's functions. Digestion in the oral cavity, its role and significance. Mechanical and chemical processing of food in the oral cavity. A functional system that ensures the formation of a food bolus adequate for swallowing. Motor component of mastication. Biomechanics of mastication. Masticatory center, its relationship with other parts of the central nervous system. Regulation of mastication. Methods for studying the mechanical function of mastication (masticography, electromyography, gnathodynamometry and chewing tests). Peculiarities of the masticogram when chewing food of various consistencies. Swallowing, its phases and mechanisms. Secretory component of mastication. Functions of the salivary glands. Composition and properties of saliva. Saliva production and secretion, regulation of these processes. The adaptive nature of salivation. Functional element of the salivary gland, non-digestive functions of the salivary glands. Physiological significance of oral and gingival fluids. Studying methods of the salivary glands and salivary ducts in humans (probing,

			sialography, thermovisiography, ultrasound). Digestion in the stomach. Quantity, composition and properties of gastric juice, the role of hydrochloric acid and its other components. The importance and role of digestion in the small intestine. Quantity, composition and properties of pancreatic juice. The role of the liver in digestion. The role of bile. Absorption of digested food components in various parts of the digestive tract, its mechanisms.	
11	UC -1 GPC-9	Physiology of excretion.	The concept of excretion. The kidney as the main excretory organ. Nephron as a structural and functional unit of the kidneys. Features of the kidney blood supply. The main functions of the kidneys: excretory, homeostatic, endocrine. The process of urine formation: filtration, reabsorption and secretion. Mechanisms of these processes, their localization and regulation. Primary and secondary urine. The role of the main humoral (hormonal) factors in the regulation of reabsorption (ADH, aldosterone, parathormone, etc.).	
12	UC -1 GPC-9	Metabolic bases of physiological functions. Physiology of thermoregulation.	Metabolism as the main condition for ensuring life and maintaining homeostasis. The role of nutrients in building up of new structures and producing energy sources. The idea of the energy balance of the body. Caloric value of various nutrients. Methods of direct and indirect calorimetry. Daily metabolism and its components. Basal metabolism, conditions for determining basal metabolism, factors affecting its value. Working exchange, daily energy consumption. The role of oral cavity receptors in the manifestation of the specific dynamic action of food. Body temperature and its daily fluctuations. Physical (heat transfer) and chemical (heat production) thermoregulation.	

5. Volume of the academic discipline and types of academic work

Type of educational work	Labor intensity		Labor intensity (AH) in semesters	
	volume in credit units (CU)	volume in academic hours (AH)	Semester 2	Semester 3
Classroom work, including	**1,8**	**66**	**34**	**32**
Lectures (L)	0,4	14	8	6
Laboratory practicum (LP)*				
Practicals (P)	1,4	52	26	26
Clinical practice (CP)				
Seminars (S)				
Student's individual work (SIW)				
Mid-term assessment	**1,2**	**42**	**20**	**22**
exam	**1**	**36**	**-**	**36**
TOTAL LABOR INTENSITY	**4**	**144**	**54**	**90**

6. The content of the discipline

6.1. Sections of the discipline and types of classes:

No.	Semester No.	Name of the section of the academic discipline	Types of lessons (in AH)*						
			L	LP	P	CP	S	SIW	total
1	2	Introduction to the subject. Basic concepts of physiology. Regulation of physiological functions.	1		3			3	7
2	2	Physiology of excitable systems.	3		7			3	13

3	2	Physiology of the central nervous system (CNS).	2		6			4	12
4	2	Physiology of the endocrine system.	-		-			3	3
5	3	Physiology of sensory systems. Sensory function of the oral cavity.	2		7			4	13
6	3	Physiology of higher nervous activity.	-		3			4	7
7	2	Physiology of blood.	-		6			4	10
8	3	Physiology of circulation.	2		10			6	18
9	2	Physiology of respiration. Respiratory and communicative functions of the oral cavity.	2		3			3	8
10	3	Physiology of digestion. Digestive function of the oral cavity	2		7			4	13
11	3	Physiology of excretion.	-		-			2	2
12	3	Metabolic bases of physiological functions. Physiology of thermoregulation.	-		-			2	2
		Exam							36
		TOTAL	**14**		**52**			**42**	**144**

* - L – lectures; LP – laboratory practicum; P – practicals; S – seminars; SIW – student's individual work.

6.2. Thematic schedule of educational work types:

6.2.1. Thematic plan of lectures*:

No	Name of lecture topics	Volume in academic hours (AH)	
		Semester 2	Semester 3
1.	Introduction to the subject "Normal physiology, physiology of the maxillofacial region". PHYSIOLOGY AND BIOPHYSICS OF EXCITABLE TISSUES Bioelectric phenomena in excitable systems. The doctrine of biocurrents. Quiescent and action currents Resting potential, action potential. Conditions for arousal. Criteria for evaluating excitability: threshold strength, time, gradient of the increase in the strength of the stimulus over time. The concept of the laws of irritation. The law of force for cells and tissues.	1 1	
2.	PHYSIOLOGY AND BIOPHYSICS OF EXCITABLE TISSUES Physiology of muscles and nerves Physiological properties of muscles. Modern theory of muscle contraction. Types and types of muscle contractions. motor units. Properties of nerve conductors. Mechanism and characteristics of nerve impulse conduction along unmyelinated and myelinated nerve fibers. Laws of conduction of excitation along the nerve.	2	
3.	PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM (CNS) Excitation and inhibition in the CNS. General principles of the coordination activity of the central nervous system Physiology of the synapse. The mechanism and features of the conduction of excitation in synapses. Inhibition in the central nervous system, its significance. Mechanisms and types of braking. Principles of coordination activity of the central nervous system (reciprocity, feedback, common final path, dominant, subordination).	2	

4	PHYSIOLOGY OF SENSORY SYSTEMS The concept of sensory systems. The concept of perception. General principles of organization of sensory systems. Sensory receptors, their physiological properties and functions. The role of the subcortical and cortical sections of the analyzers. Sensory function of the oral cavity.	1 1	
5	PHYSIOLOGY OF CIRCULATION Physiological properties of the heart. Regulation of cardiac activity Morphological characteristics and physiological properties of the heart muscle (excitability, conductivity, contractility, automaticity). Pumping function of the heart. Regulation of the activity of the heart (myogenic, humoral, nervous). Basic hemodynamic parameters. Regulation of vascular tone Structural and functional organization of the vascular system. The main indicators of hemodynamics. Volumetric and linear velocity of blood flow. Blood pressure, its types. Factors that determine the magnitude of blood pressure. Vascular tone and its regulation. Features of blood circulation in the maxillofacial region.		2
6.	PHYSIOLOGY OF RESPIRATION The concept of respiration. The main stages of respiration. External respiration, static and dynamic parameters. Biomechanics of inhalation and exhalation. Gas exchange in the lungs and tissues, its causes. Transport of oxygen and carbon dioxide. Regulation of respiration.		2
7	PHYSIOLOGY OF DIGESTION General questions of the physiology of digestion. Digestion in the mouth. Digestion, its meaning and types. Regulation of digestive functions. Features of digestion in the oral cavity. Motor, secretory and absorption functions of the oral cavity, their regulation and research methods.		2
	14 AH in total	8	6

* Full-time form of education

6.2.2. Thematic plan of laboratory practicum: not provided by GEF.

6.2.3. Thematic plan of practicals*:

No.	Topics of practicals	Volume in academic hours (AH)	
		Semester 2	Semester 3
1	**Introduction to the subject "Normal physiology, physiology of the maxillofacial region".** 1. Making of a neuromuscular preparation.	3	
2	**Physiology and biophysics of excitable systems.** *Biocurrents. Resting potential. action potential.* 1. Registration of nerve action currents. 2. Determination of the excitability of the nerve and muscle.	3	
3	**Muscle physiology.** *Physiology of nerves.* 1. Getting different types of muscle contractions.	3	

	2. Proof of the law of bilateral conduction of excitation along the nerve. 3. Control work on the subject Physiology and biophysics of excitable systems.		
4	**Physiology of the CNS.** *Patterns of conducting excitation along the reflex arc. human reflexes.* 1. The study of reflexes in humans. 2. Study of the phenomenon of irradiation in the central nervous system.	3	
5	**Physiology of the CNS.** Central inhibition. 1. Study of the nature of the interaction of reflex acts. 2. Control work on the topic of the central nervous system.	3	
6	**Physiology of sensory systems.** *General properties of sensory systems. Physiology of taste and smell.* 1. Study of receptor adaptation. 2. Determination of taste sensitivity thresholds.	3	
7	*Physiology of pain.* 1. Analysis of the scheme of pain sensitivity pathways from the organs of the maxillofacial region. *Interaction of the organs of the maxillofacial region with various body systems. Adaptation and compensation of the functions of the maxillofacial system.* 1. Study of the pharyngeal-cardiac reflex. 2. Determination of the role of the olfactory analyzer in the occurrence of taste sensations.	3	
8	**Physiology of higher nervous activity (HNA).** *Conditioned reflexes, mechanisms of their formation and inhibition, Types of GNI.* 1. Express diagnostics of the strength of nervous processes according to psychomotor indicators (tapping test).	3	
9	**Summary for the semester**	2	
10	**Physiology of blood.** *Composition and group-specific properties of blood.* 1. Determination of the blood group according to the ABO system. 2. Determination of the Rh-affiliation of the blood by the express method.		3
11	**Physiology of blood.** *Hemostasis***.** 1. Coagulography. 2. Control work on the topic of blood.		3
12	**Physiology of blood circulation.** *Physiological properties of the heart. Electrocardiography.* 1. Registration and analysis of the electrocardiogram.		3
13	*The main parameters of hemodynamics.* 1. Measurement of blood pressure in humans by the Riva-Rocci method. 2. Measurement of blood pressure in humans by the Korotkov method.		3

	3. Study of the pulse.		
	Regulation of blood circulation. 1. Study of the effect of physical activity on blood pressure.		3
14	**Physiology of respiration.** *Stages of respiration. Respiratory and communicative functions of the oral cavity. Regulation of external respiration.* 1. Spirometry. 2. Pneumography		3
15	**Physiology of digestion.** *Digestive function of the oral cavity. Motor and secretory components of chewing.* 1. The study of the activity of masticatory muscles according to electromyomasticography. 2. Analysis of the scheme of the functional system for the formation of a food bolus.		3
16	*Digestion in the stomach and intestines.* 1. Study of the effect of acetylcholine and adrenaline on intestinal motility.		3
	Summary of the material covered		2
	Total	26	26
	Total	52	

*(Full-time form of education)

6.2.4. Thematic plan of seminars: not provided by the Federal State Educational Standard.

6.2.5. Types and topics of student's individual work (SIW)

No.	Types and topics of SIW	Volume in academic hours (AH)	
		Semester 2	Semester 3
1	Preparation for practical classes, doing homework, solving situational problems, preparation for current control	7	9
2	Working with lecture material	3	3
3	Working with electronic resources at the PRMU distance education portal	4	4
4	The study of material submitted for self-study (separate topics, paragraphs), work with literature	4	4
5	Preparation for testing, online testing	2	2
6	Total	**20**	**22**

6.2.6. Student research work

No.	Name of the topics of the student's research work	Semester
1.	Features of cerebral circulation.	2
2.	Neurophysiological mechanisms of short-term memory.	3
3.	Neurophysiological mechanisms of long-term memory.	3
4.	The study of awareness in the light of modern concepts of neurophysiology.	3
5.	Psychophysiology of the emotional sphere.	3

6.	Physiological basis of the sleep-wake cycle.	3
7.	Migraine.	3

7. Types of assessment formats for ongoing monitoring and mid-term assessment

№	Semester No.	Types of control	Name of section of academic discipline	Competence codes	Assessment formats		
					types	number of test questions	number of test task options
1	2	3	4	5	6	7	8
1	2	Monitoring of mastering the topic, control of the student's independent work	Introduction to the "Normal physiology, physiology of the maxillofacial region". regulation of physiological functions.		Interview		
					Tasks (tables, graphs, figures)	1	1
					Written report on the implementation of practical work.	1	1
2	2	Monitoring of mastering the topic	Physiology of excitable systems.		Test tasks	25	2 (computer test at SDO)
					Interview		
					Test	3	6
					Tasks (tables, graphs, figures)	6	1
					Situational tasks	1-3	10
					Written report on the implementation of practical work.	4	1
3	2	Monitoring of mastering the topic	Physiology of the Central Nervous System (CNS)		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	3	1
					Interview		
					Test	3	6
					Situational tasks	1	6
					Tasks (tables, graphs, figures)	5	1
4	2	Monitoring of mastering the topic	Physiology of the endocrine system.		Reviewing the textbook and additional literature.	1	4
5	2	Monitoring of mastering the topic	Physiology of sensory systems. Sensory function of the oral cavity.		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	4	1
					Interview		
					Situational tasks	1-2	4
					Tasks (tables, graphs, figures)	6	1

6	2	Monitoring of mastering the topic	Physiology of higher nervous activity		Test tasks	25	2 (computer test at SDO)
					Interview		
					Situational tasks	3	1
					Written report on the implementation of practical work.	3	1
7	3	Monitoring of mastering the topic	Physiology of blood.		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	4	1
					Situational tasks	1	7
					Test	3	2
					Tasks (tables, graphs, figures)	2	1
8	3	Monitoring of mastering the topic	Physiology of circulation.		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	4	1
					Interview		
					Situational tasks	1-2	2
					Tasks (tables, graphs, figures)	3	1
9	3	Monitoring of student's self-study	Physiology of respiration. Respiratory and communicative functions of the oral cavity.		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	2	1
					Interview		
					Test	3	3
					Situational tasks	3	1
10	3	Monitoring of mastering the topic	Физиология пищеварения. Physiology of digestion. Digestive function of the oral cavity.		Test tasks	25	2 (computer test at SDO)
					Written report on the implementation of practical work.	2	1
					Interview		
					Test	3	3
					Situational tasks	2	1
11	3	Monitoring of mastering the topic	Metabolic bases of physiological functions. Physiology of thermoregulation .		Reviewing the textbook and additional literature.	1	4
12	3	Monitoring of mastering the topic	Physiology of excretion.		Reviewing the textbook and additional literature.	1	4

13	3	Intermediate certification (exam)	All chapters		Interview		Computer testing (the variant is formed by random sampling)

8. Educational, methodological and information support for mastering the academic discipline (printed, electronic publications, the Internet and other network resources)

8.1. Key literature references

No.	Name according to bibliographic requirements	Number of copies	
		At the department	In the library
1.	Costanzo, Linda S. Physiology / L.S. Costanzo; Costanzo, Linda S. - 6th ed. - Philadelphia: Elsevier, 2018. - 516 p	1	180
2.	Hall, John E. Textbook of medical physiology / J.E. Hall, A.C. Guyton; Hall, John E.; Guyton, Arthur C. - 13tn ed. - Philadelphia: Elsevier, 2016. - 1145 p.	2	100
3.	Дегтярев, В. П. Нормальная физиология: учебник / В. П. Дегтярев, Н. Д. Сорокина; Дегтярев В. П. ; Сорокина Н. Д. - Москва : ГЭОТАР-Медиа, 2019. - 480 с. - ISBN 978-5-9704-5130-4. - Текс : электронный. - URL: https://www.studentlibrary.ru/book/ISBN9785970451304.html.		

8.2. Further reading

No.	Name according to bibliographic requirements	Number of copies	
		At the department	At the department
1.	Нормальная физиология с курсом физиологии челюстно-лицевой области: учебник [Электронный ресурс]: учебник / под ред. В. П. Дегтярёва, С. М. Будылиной. - М: ГЭОТАР-Медиа, 2015. - http://www.studmedlib.ru. /book/ISBN9785970433515.html.		
2.	Marya, R. K. Textbook of physiology for dental students / R. K. Marya, C. M. Marya. - 3rd ed. - New Delhi : CBS Publishers & Distributors, 2013. - 560 c.	1	15
3.	Shier, D. Hole`s essentials of human anatomy & physiology / D. Shier, J. Butler, R. Lewis; Shier, D. ; Butler, J. ; Lewis, Ricki. - 12th ed. - New York : McGraw-Hill Education, 2015. - 632 p. : il.		1
4.	Физиология человека: Атлас динамических схем : учебное наглядное пособие / К. В. Судаков, В. В. Андрианов, Ю. Е. Вагин, И. И. Киселев ; Судаков К. В. ; Андрианов В. В. ; Вагин Ю. Е. ; Киселев И. И. - Москва : ГЭОТАР-Медиа, 2020. - 416 с. - ISBN 978-5-9704-5880-8. - Текст:электронный.-URL: https://www.studentlibrary.ru/book/ISBN9785970458808.htmlдиа, 2020. - 416 с.		

5.	Ноздрачев, А. Д. Нормальная физиология : учебник / А. Д. Ноздрачев, П. М. Маслюков - Москва : ГЭОТАР-Медиа, 2021. - 1088 с. - ISBN 978-5-9704-5974-4. - Текст : электронный. - URL: http://www.studmedlib.ru/book/ISBN9785970459744.html		
6.	Холл, Д. Э. Медицинская **физиология** по Гайтону и Холлу / Д. Э. Холл ; Д. Э. Холл. - 2-е, испр. и доп. - М. : Логосфера, 2018. - 1328 с. - ISBN 9785986570600. - Текст : электронный - URL: https://www.books-up.ru/ru/read/medicinskaya-fiziologiya-po-gajtonu-i-hollu-4911587/		
7.	Мухина, И.В. Физиология дыхания: учебное пособие / И. В. Мухина, О. А. Горева, В. А. Плеханов, Нижегородская государственная медицинская академия. – 5-е изд., доп. и перераб. – Н.Новгород: Изд-во НижГМА, 2014. – 60 с. : ил.	60	5
8.	Silbernagl, S. Color atlas of physiology / S. Silbernagl, A. Despopoulos. - 6th ed. - Stuttgart : Thieme, 2009. - 441 c	-	11

8.3. List of guidelines for classroom and independent work of students

No.	Name according to bibliographic requirements	Number of copies	
		At the department	At the department
1.	Physiology practical manual: learning materials for practical classes / I. V. Mukhina; Mukhina, I.V.- N. Novgorod: Publishing House of PRMU, 2019.	20	5

8.4. Electronic educational resources used in the process of teaching the discipline:

8.4.1. Internal Electronic Library System of the University (IELSU)

Name of the electronic resource	Brief description (content)	Access conditions	Number of users
Internal Electronic Library system of the University (In ELS) http://nbk.pimunn.net/MegaPro/Web	Works of the teaching staff of the University: textbooks, textbooks, collections of tasks, methodological manuals, laboratory work, monographs, collections of scientific papers, scientific articles, dissertations, abstracts of dissertations, patents	From any computer and mobile device using an individual login and password. Access mode: http://nbk.pimunn.net/MegaPro/Web	Not limited

8.4.2. Electronic educational resources acquired by University

№	Name of the electronic resource	Brief description (content)	Access conditions	Number of users
1.	EBS "Student Consultant" (Electronic database "Student Consultant". Database "Medicine. Healthcare (VO) and "Medicine. Healthcare (SPO)")	Educational literature, additional materials (audio, video, interactive materials, test tasks) for higher medical and pharmaceutical education	From any computer and mobile device using an individual login and password. Access mode: http://nbk.pimunn.net/MegaPro/Web	

	http://www.studmedlib.ru			
2.	Database "Doctor's consultant. Electronic Medical Library" https://www.rosmedlib.ru	National guidelines, clinical guidelines, textbooks, monographs, atlases, pharmaceutical reference books, audio and video materials, ICD-10 and ATX	From any computer and mobile device using an individual login and password. Access mode: http://nbk.pimunn.net/MegaPro/Web	Not limited Validity period: until 31.12.2021
3.	Electronic library system "Bukap" https://www.books-up.ru	Educational and scientific medical literature of Russian publishers, including translations of foreign publications. Within the framework of the "Big Medical Library" project, publications of universities participating in the project are available	From any computer and mobile device using an individual login and password; access is automatic from university computers. Publications from the "My Books" section are available for reading. Access mode: http://nbk.pimunn.net/MegaPro/Web	Not limited Validity period: until 31.05.2022
4.	Electronic periodicals as part of the database "Scientific Electronic Library ELibrary" https://elibrary.ru	Electronic medical journals	From university computers. Access mode: https://elibrary.ru	Not limited Validity period: until 31.12.2021
5.	Integrated Information and Library system (IBS) of the scientific and educational medical cluster of the Volga Federal District - "Srednevolzhsky" (contract on a free basis)	Electronic copies of scientific and educational publications from the collections of libraries participating in the scientific and educational medical cluster of the Volga Federal District "Srednevolzhsky"	Access by individual login and password from any computer and mobile device. Access mode: websites of libraries participating in the project	Not limited Validity period: Not limited
6.	National Electronic Library (NEB) (contract on a free basis)http://нэб.рф	Electronic copies of publications (including scientific and educational) on a wide range of knowledge	Scientific and educational works that have not been reprinted in the last 10 years are in the public domain. Works restricted by copyright – from the computers of the scientific library. Access mode: http://нэб.рф	Not limited Validity period: Not limited

8.4.3 Open access resources

No.	Name of the electronic resource	Brief description (content)	Access conditions	Number of users
Domestic resources				
1.	Federal Electronic Medical Library (FEMB) http://нэб.рф	Full-text electronic copies of printed publications and original electronic publications on medicine and biology	From any computer located on the Internet. Access mode: http://нэб.рф	Not limited
2.	Scientific Electronic Library eLIBRARY.RU https://elibrary.ru	Abstracts and full texts of scientific publications, electronic versions of Russian scientific journals	From any computer located on the Internet. Access mode: https://elibrary.ru	Not limited

3.	Open Access Scientific Electronic Library CyberLeninka http://cyberleninka.ru	Full texts of scientific articles with annotations published in scientific journals of Russia and neighboring countries	From any computer located on the Internet. Access mode: https://cyberleninka.ru	Not limited
Foreign resources within the framework of a National subscription				
1.	Electronic collection of the publishing house Springer https://rd.springer.com	Full-text scientific publications (journals, books, articles, scientific protocols, conference materials)	From university computers. Access mode: https://rd.springer.com	Not limited

9. Material and technical support for mastering an academic discipline

9.1. List of premises for classroom activities for the discipline

1. Large lecture hall of the BPhB, equipped with multimedia equipment and a microphone.

2. Classrooms No. 301, 302, 303, 305, 312, 318 BPhB for practical training, consultations, current control and intermediate certification, independent work of students with the Internet access to provide access to the electronic library "PRMU".

3. Computer class (testing center) for holding tests, with the Internet access, enabling self-study and provide access to the electronic library "PRMU".

9.2. List of equipment for classroom activities for the discipline

No.	Equipment	Meaning	Quantity
1.	Electrokymographs	Registration of cardiogram, myogram	5
2.	Electrocardiographs ЭК1Т-1/3-07	ECG recording	5
3.	Electrocardiographs ЭК1Т-1/3-07	ECG recording	5
4.	Oscilloscope С1-18	Use in an experiment to study the biophysical properties of excitable biosystems	1
5.	Amplifier УБП 203	Use in an experiment to study the biophysical properties of excitable biosystems	1
6.	Electrostimulator ЭСЛ-2	Use in an experiment to study the biophysical properties of excitable biosystems	4
7.	Electrostimulator НС-Стим –1	Use in an experiment to study the biophysical properties of excitable biosystems	5
8.	Polygraph BIOPAC MP 30B-CE, computer with screen (Biopac Student Lab 3.7.1 s/n2029; Biopac Student Lab Pro 3.7.1 s/n2029; Office Professional Plus 2010, Windows Starter https://www.microsoft.com/Licensing/servicecenter/LicensingInfo/LicenseSummary/Summary	Demonstration of methods and results of instrumental studies of physiological functions with the Internet access to provide access to the PRMU electronic library	1

	.aspx Kaspersky Endpoint Security for Business - Extended Russian Edition. 150-249Node 1 year Educational Renewal License License #115017042110151833726 4)		
9.	Bikes Atemi AC 101	Study of the effect of exercises on the cardiorespiratory system	5
10.	Tonometers	Blood pressure measurement	25
11.	Tonometers OMRON RX-3	Blood pressure measurement	1
12.	Projector Overhead Vega	Demonstration technique	1
13.	Monocular microscopes	Studying of the tissue structure	10
14.	Coagulographs	Study of hemostasis	5
15.	Компьютеры центра тестирования (Office 2010, Windows 7 https://www.microsoft.com/Licensing/servicecenter/LicensingInfo/LicenseSummary/Summary.aspx Тестирующая программа на платформе Moodle https://moodle.org/?lang=ru	Carrying out test control, with the Internet access, self-studying and providing access to the electronic library of PRMU.	16
16.	Computers with screens (Office 2010, Windows 7 https://www.microsoft.com/Licensing/servicecenter/LicensingInfo/LicenseSummary/Summary.aspx Testing program on the Moodle platform https://moodle.org/?lang=ru)	Processing of scientific and educational information.	4
17.	Neurological hammers	Study of human reflexes	5
18.	Transformers	Use in an experiment to study the biophysical properties of excitable biosystems, the activity of the central nervous system, heart, digestive system.	
19.	Induction coils	Use in an experiment to study the biophysical properties of excitable biosystems, the activity of the central nervous system, the heart.	5
20.	Dry spirometers	Examination of external respiration	15
21.	Multimedia projector Epson EB-X72 laptop (Office Professional Plus 2010, Windows Starter https://www.microsoft.com/Licensing/servicecenter/LicensingInfo/LicenseSummary/Summary.aspx Kaspersky Endpoint Security	Demonstration technique for lecturing	1

	for Business - Extended Russian Edition. 150-249Node 1 year Educational Renewal License License #115017042110151833726 4)		
22.	Sergical instruments	Use in experiments on the topics: "Physiology of excitable biosystems", "Physiology of the central nervous system", "Physiology of the cardiovascular system", "Physiology of digestion".	

9.3. A set of licensed and freely distributed software, including domestic production

Item no.	Software	number of licenses	Type of software	Manufacturer	Number in the unified register of Russian software	Contract No. and date
1	Wtware	100	Thin Client Operating System	Kovalev Andrey Alexandrovich	1960	2471/05-18 from 28.05.2018
2	MyOffice is Standard. A corporate user license for educational organizations, with no expiration date, with the right to receive updates for 1 year.	220	Office Application	LLC "NEW CLOUD TECHNOLOGIES"	283	without limitation, with the right to receive updates for 1 year.
3	LibreOffice		Office Application	The Document Foundation	Freely distributed software	
4	Windows 10 Education	700	Operating systems	Microsoft	Azure Dev Tools for Teaching Subscription	
5	Yandex. Browser		Browser	«Yandex»	3722	
6	Subscription to MS Office Pro for 170 PCs for FGBOU VO	170	Office Application	Microsoft		23618/HN10030 LLC "Softline Trade" from

	"PIMU" of the Ministry of Health of Russia					04.12.2020

10. List of changes to the working program "Normal physiology, physiology of the maxillofacial region":

Federal State Budgetary Educational Institution of Higher Education
"Privolzhsky Research Medical University"
Ministry of Health of the Russian Federation
(FSBEI HE "PRMU" of the Ministry of Health of Russia)

Department of
Normal Physiology named after N.Yu. Belenkov

CHANGE REGISTRATION SHEET

working program for the academic discipline
NORMAL PHYSIOLOGY, PHYSIOLOGY OF THE MAXILLOFACIAL REGION

Field of study / specialty / scientific specialty: _____ Dentistry (31.05.03)
(code, name)

Training profile: _____
(*name) - for master's degree programs*

Mode of study: _____full-time_____
full-time/mixed attendance mode/extramural

Position	Number and name of the program section	Contents of the changes made	Effective date of the changes	Contributor's signature
1				

Approved at the department meeting
Protocol No. _____of _____20__

Head of the Department of Normal Physiology
named after N.Yu. Belenkov, PhD, DrSci, Prof. _____/ Mukhina I.V.
signature