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**Federal State Autonomous Educational Institution of Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
NAMED AFTER PATRICE LUMUMBA  
RUDN University**

**Institute of Medicine**

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educational division (faculty/institute/academy) as higher education programme developer

**COURSE SYLLABUS**

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**NORMAL PHYSIOLOGY, PHYSIOLOGY OF THE MAXILLOFACIAL AREA**

(name of the discipline/module)

**Recommended by the Didactic Council for the Education Field of:**

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**31.05.03 DENTISTRY**

field of studies / speciality code and title

**The course instruction is implemented within the professional education programme of higher education:**

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**DENTISTRY**

higher education programme profile/specialisation title

## 1. COURSE GOAL(S)INE

The course "Normal Physiology, Physiology of the Maxillofacial Area" is included in the specialist program "Dentistry" under the specialty code 31.05.03 "Dentistry" and is studied in semesters 2 and 3 of the 1st and 2nd years. The discipline is delivered by the Department of Normal Physiology. The discipline consists of 10 sections and 25 topics and is aimed at studying fundamental information on the mechanisms and patterns of physiological processes in the human body.

The goal of mastering the discipline is for the student to acquire knowledge about the development of structures and functions of various body systems based on modern achievements in physiological science, which is necessary for the formation of a natural scientific worldview and for the practical activity of a dentist.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Normal Physiology, Physiology of the Maxillofacial Area" is aimed at developing the following competencies (or parts thereof) in students:

*Table 2.1. List of competences that students acquire through the course study*

Code	Competency	Indicators of competency achievement (learning outcomes)
GPC-9	Able to assess morphofunctional, physiological states and pathological processes in the human body to solve professional tasks	GPC-9.1 Masters the algorithm of clinical-laboratory and functional diagnostics in solving professional tasks; GPC-9.2 Able to evaluate the results of clinical-laboratory and functional diagnostics in solving professional tasks, including with the use of artificial intelligence technologies; GPC-9.3 Able to determine morphofunctional, physiological states and pathological processes in the human body;

## 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective\* component of (B1) block of the higher educational programme curriculum.

\* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

*Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results*

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
OPIK-9	Able to assess morphofunctional, physiological states and pathological processes in the human body to solve professional tasks	-	Pediatric Dentistry; Diseases of the Head and Neck; Implantology and Reconstructive Surgery; Oral Cavity Diseases; Local Anesthesia and Anesthesiology in Dentistry; Microbiology, Virology – Oral Microbiology; Orthodontics and Pediatric Prosthetics; Oral Surgery;

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
			Maxillofacial and Gnathic Surgery; Obstetrics; Biological Chemistry – Oral Biochemistry; Pathophysiology – Pathophysiology of the Head and Neck; Forensic Medicine; Medical Rehabilitation; Radiation Diagnostics; Dental Prosthetics (simple prosthetics); Prosthetics of Dentitions (complex prosthetics); Telemedicine; Pathological Anatomy – Pathological Anatomy of the Head and Neck; Ophthalmology; Topographic Anatomy and Operative Surgery of the Head and Neck;

\* - to be completed in accordance with the competency matrix and the HEP Curriculum and Work Plan

\*\* - elective disciplines/practices

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Normal Physiology" is 5 credits (180 academic hours)

Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)\*

Type of academic activities	Total academic hours		Semesters/training modules	
			3	4
<i>Contact work, academic hours</i>	122		54	68
Lectures (LC)	17		0	17
Lab work (LW)	105		54	51
Seminars (workshops/tutorials) (S)	0		0	0
<i>Self-studies</i>	37		15	22
<i>Evaluation and assessment (exam/passing/failing grade)</i>	21		3	18
<b>Total labor intensity of the discipline</b>	academic hours	<b>180</b>	72	108
	credit units	<b>5</b>	2	3

## 5. COURSE CONTENTS

Table 5.1. Content of the discipline (module) by types of academic work

Course module title	Course module contents (topics)	Academic activities types
Section 1 Physiology of Excitable Tissues	<p style="text-align: center;">1.1</p> <p>Introduction to Physiology. General Physiology and Cell Physiology. Cell membranes, transport of substances through the cell membrane. Physiology as a subject. History of physiology. Cell membrane, its structure and functions. Phospholipids. Cholesterol (cholesterin). Glycocalyx. Glycolipid. Glycoprotein. Proteins, their structure. Passive and active transport. Types of simple diffusion. Facilitated diffusion. Primary and secondary active transport. Exo- and endocytosis. Familiarization with safety regulations and rules of conduct in the educational laboratory.</p>	S
	<p style="text-align: center;">1.2</p> <p>Excitability and its parameters. Membrane potential. Action potential. Excitation. Membrane potential. Local response. Action potential. Depolarization. Overshoot. Spike. Repolarization. After-depolarization and after-hyperpolarization. Critical level of depolarization. Excitability, its changes during development of action potential. Absolute and relative refractoriness. Laws of irritation of excitable tissues. Useful time. Rheobase. Chronaxie. Parabiosis, its phases.</p>	S
	<p style="text-align: center;">1.3</p> <p>Physiology of the synapse. Physiology of the nerve fiber, nerve. Synapse. Classification of synapses. Differences in structure and function of different types of synapses. Mediators. Receptor. Agonists and antagonists of receptors. Postsynaptic potentials – excitatory, inhibitory, mechanisms of their occurrence, significance. Neuromodulators. Classification of nerve fibers. Node of Ranvier. Types of propagation of excitation along the nerve fiber. Lability.</p>	S
	<p style="text-align: center;">1.4</p> <p>Physiology of muscle contraction. Muscles, their types. Properties of muscles. Sarcomere. Actin, myosin, titin, tropomyosin, troponin. Sliding filament theory. Electromechanical coupling. Phases of muscle contraction and relaxation. Types of skeletal muscle fibers. Motor unit. Isotonic, isometric and auxotonic muscle contractions. Tetanus, its types. Optimum and pessimum. Muscle strength, its power. Smooth muscles, their properties. Nexus. Dynamometry. Study of maximum voluntary strength and strength endurance of muscles.</p>	S

Section 2 Nervous and Humoral Regulation of physiological Functions	2.1 Nervous regulation of physiological functions. Reflex and its characteristics. Main properties of nerve centers. Neuron, features of its structure. Classification of neurons. Neuroglial cells, their functions. Peripheral and central nervous system, features of their organization. Hierarchical principle. Reflex. Classification of reflexes. Reflex arc. Receptive field. Nerve center. Properties of nerve centers. Types of neuronal circuits. Inhibition. Classification of inhibition in the central nervous system. Principles of coordination activity of the CNS. Irradiation. Dominant. Study of unconditional reflexes in humans.	S
	2.2 Sympathetic, Parasympathetic, Metasympathetic NS. Role of the ANS in the development of adaptive reactions. Autonomic nervous system. Similarities and differences between the autonomic and somatic nervous systems. Sympathetic and parasympathetic divisions of the nervous system. Features of their influence on various organs and tissues. Modulator. Ino-, dromo-, chrono-, tono-, bathmotropic action. Metasympathetic division of the ANS. Mediators of the autonomic nervous system – acetylcholine, norepinephrine, dopamine, ATP, histamine, GABA. Regulatory neuropeptides. Receptors of the autonomic nervous system. Autonomic reflexes. Zakharin-Head zones. Centers of regulation of autonomic functions. Approximate assessment of human autonomic tone by questionnaire method. Assessment of autonomic tone by Kerdo index.	S
	2.3 Humoral regulation of physiological functions. Physiology of endocrine glands. General properties of hormones, hierarchy in the activity of endocrine glands. Humoral regulation. Endocrine gland. Hormones. Biological properties of hormones: strict specificity of physiological action, high biological activity, distant nature of action, generalization of action, prolonged action. Functions of hormones: regulation of growth, development and differentiation of organs and tissues, adaptation of the organism to changing conditions of existence, maintenance of homeostasis. Effector hormones. Tropic hormones. Releasing hormones: liberins, statins. Hypothalamic-pituitary system. ACTH. Thyroid-stimulating hormone. Gonadotropic hormones. Somatotrophic hormone. Prolactin. Vasopressin. Oxytocin. Melatonin. Thyroid gland. Thyroxine. Triiodothyronine. Calcitonin. Parathyroid gland. Parathyroid hormone. Adrenal glands. Mineralocorticoids. Glucocorticoids. Sex hormones. Adrenaline. Norepinephrine. Pancreas. Insulin. Glucagon. Gonads. Estrogens. Androgens. Determination of blood glucose concentration in humans. Assessment of glycemic curve when consuming products with different glycemic indices.	S
Section 3  Physiology of Higher Nervous Activity	3.1 Physiology of HNA. Conditioned reflex. Types of HNA and temperament. Reflex. Higher nervous activity. Unconditioned and conditioned reflex. Conditioned and unconditioned stimuli. Instinct. Stages of conditioned reflex formation. Temporary connection. Conditioned reflexes of higher orders. Dynamic stereotype. Types of inhibition of conditioned reflexes. Irradiation of excitation. Concentration of excitation. Induction of excitation (positive and negative). Properties of nervous processes. Temperament. Types of higher nervous activity. Neurosis, its phases. First and second signal systems. Determination of HNA type in humans. Determination of psychological characteristics of personality using the EPI personality questionnaire (H. Eysenck method).	S
	3.2 Memory. Sleep. Attention. Memory, its types. Memorization, its types. Theories of formation of short-term and long-term memory. Needs. Motivations. Emotions. Functional system of behavior. Situational afferentation. Dominant motivation. Afferent synthesis. Acceptor of action results. Goal setting. Action program. Functional asymmetry of the brain. Sleep. Phases and stages of sleep. Theories of sleep. EEG rhythms. Study of attention switching. Dependence of memory volume on degree of meaningfulness of material. Electroencephalography.	S
Section 4 Physiology of Sensory Systems	4.1 General physiology of analyzers. Somatosensory sensitivity. Study of spatial threshold of tactile sensitivity. Analyzer, its structure. Sensitivity, its types. Stimulus. Classification of stimuli. Adequacy of stimuli. Sensation (feeling) – qualitative and quantitative characteristics. Types of sensation thresholds. Receptors, their classification.	S

	<p>Properties of receptors. Types of information coding in receptors. Principle of "labeled line". Pattern. Tactile sensitivity. Meissner's corpuscles, Merkel's discs, Pacinian corpuscles. Conducting pathways and central division of the tactile analyzer. Interoception. Types of receptors of the visceral analyzer. Conducting pathways and central division of the visceral analyzer. Proprioception. Types of proprioceptors. Conducting pathways and central division of the proprioceptive analyzer. Nociception. Types of pain. Classification of nociceptors. Conducting pathways and central division of the pain analyzer. Referred pain, phantom pain. Antinociceptive system. Study of spatial threshold of tactile sensitivity. Study of temperature sensitivity (thermoesthesiometry).</p>	
	<p style="text-align: center;">4.2</p> <p>Physiology of vision.  Visual analyzer, structure. Eye – membranes of the eyeball, cornea, sclera, chambers of the eye, ciliary body, iris, zonule of Zinn, lens, pupil. Miosis. Mydriasis. Spherical and chromatic aberrations. Features of the structure of the retina of the eye. Rods and cones. Fovea centralis. Blind spot. Vitreous body. Accommodation. Diopter. Refraction. Emmetropia, myopia, hypermetropia. Presbyopia. Astigmatism. Photopic and scotopic vision. Rhodopsin. Iodopsin. Classification of nerve cells of the retina. Electroretinogram. Conducting pathways of the visual analyzer. Visual field. Perimetry. Scotoma. Types of hemianopsias. Theories of color vision. Protanopia. Deutanopia. Tritanopia. Achromatopsia. Visual acuity. Binocularity of vision. Determination of visual acuity. Determination of visual field (perimetry).</p>	S
	<p style="text-align: center;">4.3</p> <p>Physiology of hearing and vestibular apparatus.  Hearing. Sound-capturing, sound-conducting and sound-perceiving apparatuses. External ear. Tympanic membrane. Scala and labyrinths of the inner ear. Endolymph, perilymph. Organ of Corti. Coding of pitch and loudness of sound. Resonance theory and place theory. Conducting pathways and centers of the auditory analyzer. Spatial hearing. Vestibular analyzer. Semicircular canals and vestibule. Otolithic apparatus, cupula. Stereocilia and kinocilium. Conducting pathways and centers of the vestibular analyzer. Nystagmus. Comparison of air and bone conduction (Rinne test).</p>	S
	<p style="text-align: center;">4.4</p> <p>Physiology of taste and smell.  Taste. Primary taste sensations. Taste buds, their types. Adaptation of taste receptors. Mechanisms of taste reception. Conducting pathways of the gustatory analyzer. Dysgeusias. Hypo- and hypergeusia, parageusia. Smell. Olfactory bulb. Stereochemical theory of olfaction. Conducting pathways of the olfactory analyzer. Acuity of smell. Hypo- and hyperosmia, anosmia, parosmia. Determination of thresholds of taste sensitivity. Determination of the role of olfaction in the emergence of taste sensations.</p>	S
Section 5 Physiology of Blood	<p style="text-align: center;">5.1</p> <p>Function and composition of blood. Blood plasma. Formed elements of blood. Blood, its main functions. Volume, density, viscosity of blood. Osmotic pressure of blood. Suspension stability of blood. Composition of blood plasma. Formed elements of blood, their functions. Hemoglobin. Forms of hemoglobin. Erythropoiesis. Hemolysis. Leukocyte formula, its shift. Protective systems of the organism. Non-specific and specific protective mechanisms. Regulation of hemopoiesis. Blood groups. ABO system. Rh system. Agglutinins. Agglutinogens. Rules of blood transfusion. Rh conflict. Determination of blood group and Rh factor.</p>	S
	<p style="text-align: center;">5.2</p> <p>Buffer systems of blood. Hemostasis.  Acid-base state, its main indicators. Buffer systems of blood. Alkalosis. Acidosis. System of regulation of the aggregate state of blood. Hemostasis – coagulation, vascular-platelet. Blood coagulation factors. Fibrinolysis. Anticoagulation system. Primary and secondary anticoagulants. Determination of bleeding time. Determination of clotting time.</p>	S
Section 6 Physiology of Respiration	<p style="text-align: center;">6.1</p> <p>Physiology of respiration. External respiration. Role of respiratory musculature. Air volumes characterizing respiration, and capacities.  Respiration, its stages. Respiratory environment. Inhalation. Exhalation. Pleural cavity. Respiratory muscles. Surfactant. Intrapulmonary and intrapleural pressure. Pneumothorax. Atelectasis. Spirometry. Spirography. Tidal volume. Inspiratory</p>	S

	<p>reserve volume. Expiratory reserve volume. Residual volume. Vital capacity of lungs. Total lung capacity. Functional residual capacity. Inspiratory capacity. Minute ventilation. Expected vital capacity of lungs. Forced vital capacity of lungs. Dead space of lungs – anatomical, functional. Spirometry.</p>	
	<p style="text-align: center;">6.2</p> <p>Biophysics of gas exchange. Transport of respiratory gases. Regulation of respiration. Forms of oxygen transport: oxygen dissolved in plasma; oxygen bound to hemoglobin (oxyhemoglobin). Oxygen capacity of blood. Oxyhemoglobin dissociation curve. Forms of carbon dioxide transport: carbon dioxide dissolved in plasma; carbon dioxide bound to hemoglobin (carbhemoglobin); carbon dioxide in the form of bicarbonates. Respiratory center. Reflex regulation of respiration. Humoral regulation of respiration. Hypoxia. Hyperoxia. Hypocapnia. Hypercapnia. Conducting hypoxemic tests of Stange and Genchi.</p>	S
Section 7 Physiology of the Cardiovascular System	<p style="text-align: center;">7.1</p> <p style="text-align: center;">Physiology of the heart.</p> <p>Cardiac cycle. Properties of cardiac muscle. Role of heart valves. Heart sounds. Electrocardiography. Waves, intervals, segments of ECG. Electrical axis of the heart. Conducting system of the heart. Pacemaker of the heart. Gradient of automaticity. Extrasystole. Compensatory pause. Fibrillation of the heart. Recording of electrocardiogram. Interpretation of normal electrocardiogram. Nervous and humoral regulation of cardiac work.</p>	S
	<p style="text-align: center;">7.2</p> <p style="text-align: center;">Physiology of blood vessels.</p> <p>Main laws of hemodynamics. Microcirculation and lymph flow. Methods for studying circulation. Measurement of arterial blood pressure. Assessment of cardiovascular system parameters at rest and during physical activity. Arterial blood pressure. Diastolic arterial blood pressure. Pulse arterial blood pressure. Systolic arterial blood pressure. Mean arterial blood pressure. Arterial pulse. Venous pulse. Venous pressure. Venous return. Cardiac diastole. Cardiac output. Cardiac index. Cardiac cycle. Circulatory system. Cardiac systole. Vascular resistance. Stroke volume. Measurement of arterial blood pressure. Assessment of cardiovascular system parameters at rest and during physical activity.</p>	S
Section 8 Excretion, Physiology of the Kidneys	<p style="text-align: center;">8.1</p> <p style="text-align: center;">System of excretory organs. Urine formation in the kidneys. Kidneys as an organ of homeostasis.</p> <p>Excretion. Organs of excretion. Kidneys, their functions. Cortical substance. Medullary substance. Nephron. Malpighian corpuscle. Bowman's capsule. Proximal and distal tubules. Loop of Henle. Collecting ducts. Urine formation. Glomerular filtration. Effective filtration pressure. Glomerular filtration rate. Clearance. Tubular reabsorption, its mechanisms. Tubular secretion. Countercurrent multiplier system. Diuresis. Antidiuresis. Water diuresis. Components of urine. Study of certain urine components using diagnostic strips.</p>	S
	<p style="text-align: center;">8.2</p> <p style="text-align: center;">Non-urine-forming functions of the kidneys. Role of kidneys in development of adaptive reactions of the body.</p> <p>Nervous regulation of kidney function. Humoral regulation of kidney function – ADH, aldosterone, natriuretic hormone, parathyroid hormone, calcitonin, adrenaline, insulin, thyroxine, glucagon, prostaglandins. Erythropoietin. Thrombopoietin. Role of kidneys in formation of vitamin D (calcidiol, calcitriol). Thromboplastin. Thromboxane. Urokinase. Prostacyclin. Renin-angiotensin-aldosterone system. Metabolic function of kidneys. Diuretics. Clearance. Urine excretion.</p>	S

<p style="text-align: center;">Section 9</p> <p style="text-align: center;">Physiology of Digestion</p>	<p>9.1</p> <p>Functions of the digestive tract. Motility of the digestive tract. Secretory function and digestion in the oral cavity.  Digestion. Digestive conveyor. Proper digestion, symbiont digestion, autolytic digestion, intracellular digestion, extracellular digestion. Digestive and non-digestive functions of the gastrointestinal tract. Mastication. Swallowing. Peristalsis. Food-related receptive relaxation. Peristalsis. Rhythmic segmentation. Pendulum movements. Tonic contractions. Antiperistalsis. Sphincters of the gastrointestinal tract. Saliva, its composition and functions. Regulation of salivation. Digestion of starch by enzymes of human saliva. Determination of active reaction of saliva (pH) using universal indicator paper.</p>	<p style="text-align: center;">S</p>
	<p>9.2</p> <p>Secretory function and digestion in the stomach, small and large intestine. Role of the liver in digestion. Absorption of nutrients in the gastrointestinal tract.  Stomach, its functions. Gastric juice. Pepsin. Gastric acid. Intrinsic factor of Castle. Gastric secretion, its regulation and phases. Pancreas. Pancreatic juice. Trypsin. Chymotrypsin. Ribo- and deoxyribonuclease. Pancreatic lipase. Lipase. Phospholipase. Elastase. Alpha-amylase. Carboxypeptidase. Phases of pancreatic secretion, their features. Liver, its functions. Bile, its composition and functions. Choleresis. Cholekinesis. Bile acids. Emulsification of fats. Micelle. Bile pigments. Hepato-enteric recirculation. Jaundice, types of jaundice. Distant (cavitary) and contact (mural) digestion. Intestinal juice, its composition. Enterokinase. Cholecystokinin-pancreozymin. Glycocalyx. Peptidase. Disaccharidase. Lactase. Absorption. Contraction of microvilli. Large intestine, functions of its divisions. Role of symbiont digestion. Enteric nervous system. Sympathetic and parasympathetic influences on the gastrointestinal tract. Hunger, theories of its occurrence. Primary and secondary satiety. Study of enzymatic properties of gastric juice. Effect of bile on fats</p>	<p style="text-align: center;">S</p>
<p style="text-align: center;">Section 10</p>	<p>10.1</p> <p>Human metabolism. Energy metabolism. Determination of metabolic rate. Basal metabolism, daily energy expenditure. Intake and expenditure of substances in the body. Metabolism of proteins, fats, carbohydrates and trace elements.  Energy and plastic metabolism. Anabolism. Catabolism. Calorie. Calorimetric bomb. Calorimetry, its types. Calorimetric equivalent of oxygen. Basal metabolism. Surface rule. Daily energy expenditure, its components. Regulation of energy metabolism. Proteins, composition of proteins. Replaceable and irreplaceable amino acids. Wear coefficient. Nitrogen balance – positive, negative, nitrogen equilibrium. Lipids – triglycerides, fatty acids, cholesterol, phospholipids. Transport of lipids. Lipoproteins, their types. Carbohydrates, features of their metabolism. Water balance of the organism. Role of mineral substances in the human body. Regulation of metabolism of proteins, fats and carbohydrates. Body mass index. Caliperometry. Determination of expected basal metabolism by various methods. Determination of percentage deviation of basal metabolism from normal by Reed method. Assessment of human metabolic state by body weight analysis (calculations of body mass index and ideal body weight). Assessment of distribution of fat deposits in humans by waist/hip ratio. Assessment of body fat mass in humans by caliperometry.</p>	<p style="text-align: center;">S</p>
<p style="text-align: center;">Metabolism and Energy. Thermoregulation.</p>	<p>10.2</p> <p>Neurohumoral regulation of metabolism in the body. Physiological foundations of nutrition. Main principles of composing food rations. Thermoregulation. Body temperature and thermoreception.  Nutrition. Theory of balanced nutrition. Theory of adequate nutrition. Principles of composing food rations. Body mass index. Temperature coefficient. Poikilothermy and homeothermy. Heterothermy. Heat balance. Heat production and heat loss.  Thermoregulation, its types. Chemical thermoregulation. Contractile and non-contractile thermogenesis. Physical thermoregulation. Heat radiation. Heat conduction (conduction). Convection – free and forced. Evaporation. Temperature shell and core. Reflex thermoregulation. Humoral thermoregulation. Thermoreceptors. Centers of thermoregulation. Mechanisms of maintaining temperature homeostasis. Thermoregulation under changes in external environment temperature. Acclimatization. Hypothermia. Hyperthermia. Fever. Pyrogens.</p>	<p style="text-align: center;">S</p>

Section 11 Metabolism and Energy. Thermoregulation.	11.1 Human metabolism. Energy metabolism. Determination of metabolic rate. Basal metabolism, daily energy expenditure. Intake and expenditure of substances in the body. Metabolism of proteins, fats, carbohydrates and trace elements. Laws of thermodynamics and their application in physiology. Organism as a thermodynamic system. Types of calorimetry. Calorimetric coefficient of a substance, respiratory quotient and calorimetric equivalent of oxygen. Caloric value of food products. Concept of metabolism and energy. Characteristics of anabolism and catabolism processes. Basal metabolism, magnitude and factors determining it. Standard conditions. Determination of expected basal metabolism by various methods. Determination of percentage deviation of basal metabolism from normal by Reed method. Methods for determining energy expenditure of the body. Energy balance of the body. Working metabolism. Specific dynamic action of food. Energy expenditure of the body under different types of labor activity. Determination of daily energy expenditure of the body. Plastic and energy role of proteins, fats and carbohydrates. Physiological significance of water and mineral substances in the body. General biological characteristics of main groups of vitamins.	S
	11.2 Neurohumoral regulation of metabolism in the body. Physiological foundations of nutrition. Metabolism of proteins, fats, carbohydrates and its regulation. Role of the liver in metabolism of carbohydrates, fats and proteins. Body weight as an objective indicator of balance between intake and expenditure of energy. Concept of normal body weight and its regulation. Physiological foundations of nutrition. Concept of normal requirement for nutrients. Nutrition norms depending on age, type of work and state of the body. Daily requirement for proteins, fats, carbohydrates. Nitrogen balance. Physiological principles of composing food rations. Concept of rational balanced nutrition. Assessment of human metabolic state by body weight analysis (calculations of body mass index and ideal body weight). Assessment of distribution of fat deposits in humans by waist/hip ratio. Assessment of body fat mass in humans by caliperometry. Composition and assessment of food rations.	S

\* – to be completed only for **FULL-TIME** study: LC – lectures; LW – laboratory work; S – practical/seminar classes.

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom Equipment and Technology Support Requirements

Type of auditorium	Equipment of the auditorium	Specialized educational/laboratory equipment, software and materials for mastering the discipline (if necessary)
Lecture	Auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means for multimedia presentations.	Set of specialized furniture; technical means: multimedia projector "Optoma", speakers "Genius", nettop Lenovo, wall-mounted screen with electric drive.
		Set of specialized furniture; technical means: multimedia projectors "Optoma", "View Sonic", speakers "Genius", "Dialog", nettops Lenovo, personal computers "CM", wall-mounted screens with electric drive Digis. Educational computer programs used in practical classes: testing program "Mytest". Technical means: complex for laboratory work (BIOZHEZL), educational films, universal stand, set of tables, universal

Lab-work	Auditorium for conducting laboratory work, individual consultations, current monitoring and interim assessment, equipped with a set of specialized furniture and equipment.	indicator paper (pH), test strips for determining urine components, neurological hammer, set of tuning forks, caliper, measuring tape, Weber compass, ruler, hand dynamometer, coliclon Anti-A, Anti-B and anti-AB for determining blood groups according to ABO system, coliclon Anti-D for determining Rh factor according to Rh system, microscopes "Mikromed", electrocardiographs EK1T-O7 and Axion, sphygmomanometer, phonendoscope, air spirometer, stopwatch, Förster perimeter, Sivtsev tables, portable glucometer, electroencephalograph, thermoesthesiometer, templates for thermoesthesiometry, sets of laboratory glassware.
<i>Self-studies</i>	Audience for independent work of students (may be used for conducting seminar classes and consultations), equipped with a set of specialized furniture and computers with access to the Electronic Information and Educational Environment (EIEE).	Set of specialized furniture; technical means: multimedia projector "Optoma", speakers "Genius", nettop Lenovo, wall-mounted screen with electric drive.

\* – audience for independent work of students must be indicated **MANDATORILY!**

## 7. RESOURCES RECOMMENDED SOURCES FOR COURSE STUDY

### *a) Main readings:*

1. Мельник, В. А. Human physiology = Физиология человека. В 2 частях. Часть 1 : учебное пособие / В.А. Мельник, С.Н. Мельник, Ю.И. Брель ; под ред. В.А. Мельника ; пер. на англ. яз. М.В. Петренко, Ю.И. Брель, С.И. Мельник, В.А. Мельник. — Москва : ИНФРА-М ; Гомель : ГомГМУ, 2026. — 304 с. : ил. - ISBN 978-5-16-021637-9. - Текст : электронный. - URL: <https://znanium.ru/catalog/product/2233195> (дата обращения: 28.04.2026). – Режим доступа: по подписке.

### *Additional literature:*

1. Normal physiology = Нормальная физиология : textbook for students independent work / Ye.V. Dorokhov, A.V. Karпова, Y.V. Bulgakova [et al.]. - Moscow : GEOTAR-Media, 2021. - : il. - Книга на английском языке.

### *Resources of the information and telecommunication network "Internet":*

1. RUDN ELS and third-party ELS to which university students have access based on concluded agreements:

- Electronic Library System of RUDN – ELS RUDN <http://lib.rudn.ru/MegaPro/Web>
- ELS "University Library Online" <http://www.biblioclub.ru>
- ELS Yurait <http://www.biblio-online.ru/>
- ELS "Consultant Student" [www.studentlibrary.ru](http://www.studentlibrary.ru)

- ELS "Troitsky Most"
- 2. Databases and search engines:
  - Electronic fund of legal and normative-technical documentation <http://docs.cntd.ru/>
  - Search engine Yandex <https://www.yandex.ru/>
  - Search engine Google <https://www.google.ru/>
  - Abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>

*Educational and methodological materials for independent work of students in mastering the discipline/module: \**

1. Course of lectures on the discipline "Normal Physiology, Physiology of the Maxillofacial Area".

\* – all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the discipline page **in E-SYSTEM!**

### **DEVELOPERS:**

Professor of the  
Department of Normal  
Physiology

*Position, Academic Unit*

Torshin Vladimir  
Ivanovich

*Signature*

*Full name*

Professor of the Department of  
Normal Physiology

*Position, Academic Unit*

Sveshnikov Dmitry  
Sergeevich

*Signature*

*Full name*

Associate Professor of the  
Department of Normal Physiology

*Position, Academic Unit*

Yakunina Elena  
Borisovna

*Signature*

*Full name*

### **HEAD OF EDUCATIONAL DEPARTMENT:**

Head of the Department of  
Normal Physiology,  
Professor

*Position, Academic Unit*

Torshin Vladimir  
Ivanovich

*Signature*

*Full name*

### **HEAD OF HIGHER EDUCATION PROGRAMME:**

Deputy Director for Academic  
Affairs of the specialty "Dentistry",  
Professor

*Position, Academic Unit*

Razumova  
Svetlana  
Nikolaevna

*Signature*

*Full name*