

Test specification

Intended examinee population:	Students (3rd year)
Educational program:	“General Medicine”
Aim:	Assessment of the achievement of final learning outcomes in basic disciplines of integrated medical education programs
Assessment Format:	Assessment of knowledge and skills (computer-based testing) 150 MCQ A-type questions Block 1 (knowledge assessment): 150 test questions Block 2 (skills assessment): 10 test questions Duration: 210 minutes (without a break) Passing threshold: Block 1: 75 points (50%) Block 2: 5 points (50%)

№	Key questions/	Weight (%)	Number of TQ
Block 1: General principles of fundamental disciplines			
1	Biochemistry and Molecular Biology <ul style="list-style-type: none"> • Gene expression: DNA structure, replication, repair and epigenetics, gene transcription, translation, post-translational processing, protein modifications and localization (degradation). • Structure and function of proteins and enzymes. Energy metabolism. 		2
2	Cell Biology <ul style="list-style-type: none"> • Adaptive cellular responses and cellular homeostasis; mechanisms of injury and necrosis, including pathological processes; apoptosis. • Cell cycle and regulation of the cell cycle. Mechanisms of dysregulation. 		2
3	Human Genetics and Development <ul style="list-style-type: none"> • Principles of pedigree analysis. • Population genetics: Hardy–Weinberg law. • Mutation–selection balance. • Principles of gene therapy. • Genetic testing and counseling. • Genetic mechanisms. 		2
4	Inflammation and Repair (Biology of Tissue Response to Disease) <ul style="list-style-type: none"> • Acute and chronic inflammatory reactions (patterns of response). • Stages of repair and mechanisms of tissue regeneration. 		2
5	Pharmacology <ul style="list-style-type: none"> • Pharmacodynamic and pharmacokinetic processes. • Pharmacokinetics: absorption, distribution, metabolism, excretion, dosing intervals. • Mechanisms of drug action, structure–activity relationships. • Relationship between concentration, dose, and effect. • Mechanisms of drug interactions. • Individual factors affecting pharmacokinetics and pharmacodynamics. 		2
6	Microbiology <ul style="list-style-type: none"> • Classification of major groups of bacteria, viruses, fungi, and parasites. • Key mechanisms of pathogenicity and principles of microorganism identification 		3

7	Immunology <ul style="list-style-type: none"> • Structure of immune-competent organs. • Cells of innate and adaptive immunity; mediators of the immune response. • Mechanisms of immunodeficiency, autoimmune diseases, hypersensitivity. • Effects of age and medications on immune function. • Disorders associated with HIV/AIDS immunodeficiency. • Immunologically mediated diseases. • Effects of age and drugs on the immune system 		3
8	Mental Health <ul style="list-style-type: none"> • Major groups of mental disorders (psychotic, anxiety, affective, somatoform, etc.). • Behavioral disorders and disorders related to psychoactive substance use. 		2
9	Social Sciences and Ethics <ul style="list-style-type: none"> • Communication skills and patient-centered communication. • Principles of medical ethics, informed consent, confidentiality. • Basics of patient safety. • 		2
10	Biostatistics <ul style="list-style-type: none"> • Interpretation of sensitivity, specificity, and predictive values of tests. • Basic methods of data analysis and principles of epidemiology. 		2
Cardiovascular System			
11.1	Heart Anatomy <ul style="list-style-type: none"> • Structure of atria and ventricles; fibrous skeleton of the heart; valvular apparatus: leaflets, fibrous rings, chordae tendineae, papillary muscles. • Blood supply and lymphatic drainage. • Cardiac conduction system. 		3
11.2	Histology <ul style="list-style-type: none"> • Embryonic development. • Structure of cardiomyocytes and intercellular junctions (intercalated discs, gap junctions). • Histological features of the conduction system (SA node, AV node, His bundle, bundle branches, Purkinje fibers). 		2

	<ul style="list-style-type: none"> • Histological structure of endocardium, myocardium, and epicardium. • Structure of arterial, venous, and capillary walls. 		
11.3	<p>Physiology of the Heart and Vessels</p> <ul style="list-style-type: none"> • Cardiac cycle, stroke volume, and cardiac output. • Mechanisms of autonomic and humoral regulation of the heart. • Mechanisms of arterial pressure regulation. • Functional characteristics of arteries, veins, and capillaries. • Interpretation of circulatory system parameters in normal and pathological conditions. 		3
11.4	<p>Pathology</p> <ul style="list-style-type: none"> • Disorders of coronary circulation. • Rhythm and conduction disturbances. • Impaired contractile function of the heart. • Inflammatory processes. • Vascular wall lesions. • Hemodynamic disorders. • Valvular heart diseases. • Congenital heart defects (including those manifesting in adults). • Tumors of the heart and pericardium. <p>□ Traumatic and mechanical cardiac injuries.</p> <ul style="list-style-type: none"> • Adverse drug effects on the cardiovascular system. • Semiology of clinical manifestations: ischemic pain and major clinical conditions; hemodynamic disorders of the heart and pulmonary circulation; mechanisms of arrhythmias and edema formation; types of edema; cyanosis and basics of hypoxemia; manifestations of chronic hypertension; forms of acute circulatory failure (collapse, shock). 		5
11.5	<p>Pediatric Cardiovascular Features</p> <ul style="list-style-type: none"> • Signs of heart failure in children. • Semiology of congenital heart defects. 		2
11.6	<p>Cardiovascular Pharmacology</p> <ul style="list-style-type: none"> • Antihypertensive drugs (ACE inhibitors, ARBs, calcium channel blockers, beta-blockers). • Diuretics. 		2

	<ul style="list-style-type: none"> • Anticoagulants and antithrombotic therapy. • Cardiac glycosides. • Statins. 		
Respiratory system			
12.1	<p>Anatomy</p> <ul style="list-style-type: none"> • Structure of the upper and lower airways. • Segmental structure of the lungs. • Anatomy of the trachea, main and segmental bronchi, bronchioles; architecture of the acinus, terminal and respiratory bronchioles. • Structure of the pleura (parietal and visceral) and the pleural cavity. • Blood supply: bronchial and pulmonary circulation. Features of the dual blood supply of the lungs. Lymphatic drainage pathways. 		4
12.2	<p>Histology</p> <ul style="list-style-type: none"> • Embryonic development. • Epithelial composition of the airways (pseudostratified ciliated epithelium, goblet cells). • Structure of the bronchial wall (cartilage plates, glands, smooth muscle). • Histological features of bronchioles (absence of cartilage, prominent smooth muscle layer). • Structure of alveoli (type I and type II pneumocytes, surfactant). • Alveolar macrophages, interstitium, and capillary network. 		2
12.3	<p>Physiology</p> <ul style="list-style-type: none"> • Mechanics of inspiration and expiration (role of the diaphragm and intercostal muscles). • Static and dynamic lung volumes. • Factors determining airway resistance. • Ventilation–perfusion ratio (V/Q). • Diffusion of O₂ and CO₂ across the alveolar–capillary membrane. • Regulation of breathing; role of central and peripheral chemoreceptors. • 		5
12.4	<p>Pathology</p> <ul style="list-style-type: none"> • Airway obstruction. • Ventilation disorders. • Alveolar injury. • Inflammatory processes of the airways. • Impaired gas exchange. 		7

	<ul style="list-style-type: none"> • Pleural diseases. • Thromboembolic processes. • Chronic interstitial changes. • Semiology of respiratory system disorders: mechanisms of respiratory failure; auscultatory findings; percussion signs; breathing pattern abnormalities; clinico-morphological syndromes of the respiratory system. 		
12.5	<p>Age-related Features in Children</p> <ul style="list-style-type: none"> • Anatomical immaturity of the airways. • Physiological characteristics of breathing. • Functional reactivity. 		1
12.6	<p>Pharmacology</p> <ul style="list-style-type: none"> • Bronchodilators. • Glucocorticosteroids. • Mucolytics and expectorants. • Antibiotics and antivirals. • Antihistamines and adrenergic agents for allergy. • Antitussive agents. 		2
Digestive system			
13.1	<p>Anatomy</p> <ul style="list-style-type: none"> • Structure of the gastrointestinal tract (esophagus, stomach, small and large intestines). • Anatomy of the liver (lobes, segments, vascular and biliary structures). • Structure of the gallbladder and ducts; pancreas (parts and ducts). • Peritoneum, mesentery, and abdominal cavity spaces. • Blood supply of the GI tract; lymphatic drainage of the abdominal cavity. 		2
13.2	<p>Histology</p> <ul style="list-style-type: none"> • Embryonic development. • Mucosa of different GI tract segments. • Histological structure of the liver. • Histology of the pancreas (acini and islets of Langerhans). • Histological structure of the gallbladder and bile ducts. 		2
13.3	<p>Physiology</p>		3

	<ul style="list-style-type: none"> • GI motility (peristalsis, segmentation, sphincter tone). • Mechanisms of secretion in different GI segments. • Digestion of proteins, fats, and carbohydrates. • Physiology of absorption in the small intestine. • Liver functions (detoxification, protein synthesis, bilirubin metabolism). • Regulation of bile secretion. • Exocrine and endocrine functions of the pancreas. 		
13.4	<p>Pathology</p> <ul style="list-style-type: none"> • Inflammatory processes. • Motility disorders. • Disorders of secretion and digestion. • Malabsorption. • Portal and vascular disorders. • Liver diseases. • Pancreatic diseases. • Semiology of GI disorders: types of abdominal pain and mechanisms; dyspeptic syndrome; stool changes (frequency, consistency, melena, hematochezia, steatorrhea); types of diarrhea and causes of constipation; hemodynamic signs of massive blood loss; types of jaundice and mechanisms of hyperbilirubinemia; stool and urine color changes in jaundice; peritoneal signs and peritoneal irritation; dysphagia and its mechanisms; signs of upper and lower GI bleeding. 		4
13.5	<p>Pediatric GI Features</p> <ul style="list-style-type: none"> • Anatomical and physiological features of digestion. • Functional immaturity of the GI tract in children. • Increased vulnerability of water–electrolyte balance. 		2
13.6	<p>Pharmacology</p> <ul style="list-style-type: none"> • Proton pump inhibitors (PPIs). • H₂-receptor blockers. • Antacids. • Prostaglandin analogues. • Antidiarrheal agents. • Antiemetic drugs. 		2

Nervous System and Sensory Organs			
14.1	<p>Anatomy</p> <ul style="list-style-type: none"> • Structure of the brain (hemispheres, lobes, gyri, functional areas). • Structure of the brainstem. • Structure of the cerebellum. • Structure of the spinal cord. • Meninges and cerebrospinal fluid spaces. • Cranial nerves and their functions. • Internal brain structures (thalamus, basal nuclei, hippocampus). 		2
14.2	<p>Histology</p> <ul style="list-style-type: none"> • Embryonic development. • Structure of neurons and types of synapses. • Glial cells and their functions. • Myelinated and unmyelinated fibers. • Organization of gray and white matter of the CNS. • Barriers of the nervous system (blood–brain barrier and blood–CSF barrier). 		2
14.3	<p>Physiology</p> <ul style="list-style-type: none"> • Nerve impulse conduction and action potential. • Synaptic transmission. • Excitatory and inhibitory interactions in the CNS. • Regulation of sleep, wakefulness, and consciousness. • Control of motor activity (cortex, subcortical structures, cerebellum, spinal cord). • Types of sensation. • Regulation of the autonomic nervous system. 		2
14.4	<p>Pathology</p> <ul style="list-style-type: none"> • Ischemic and hypoxic injuries. • Inflammatory processes. • Degenerative processes. • Increased intracranial pressure. • Seizure predisposition. • Peripheral nervous system disorders. • CNS tumors. • Traumatic and mechanical injuries. 		4

	<ul style="list-style-type: none"> • Congenital CNS diseases. • Semiology of neurological disorders: mechanisms of headache (vascular, muscular, CSF-related); disorders of consciousness and their neurophysiological basis. 		
14.5	Pediatric Nervous System Features <ul style="list-style-type: none"> • Structural features of the skull in children and fontanelles. • Signs of increased intracranial pressure in children. • Primitive reflexes and their diagnostic significance. 		1
14.6	Pharmacology <ul style="list-style-type: none"> • Anticonvulsants. • Antidepressants. • Analgesics and drugs for neuropathic pain. • Hypnotics and anxiolytics. 		2
14.7	Sensory Organs <ul style="list-style-type: none"> • Structure and functions of the sensory organs (vision, hearing, smell, touch). Taste and olfactory receptors and sensory pathways. • Ear diseases. 		2
Endocrine system			
15.1	Anatomy <ul style="list-style-type: none"> • Structure of the hypothalamus and pituitary gland • Anatomy of the thyroid and parathyroid glands • Structure of the adrenal glands (zona glomerulosa, zona fasciculata, zona reticularis, medulla) • Islets of Langerhans of the pancreas and hormone-producing cells 		1
15.2	Histology <ul style="list-style-type: none"> • Embryonic development • Hormone-producing cells of the adenohypophysis and their functions • Cells of the posterior pituitary and its connection with the hypothalamus • Thyrocytes, follicles, and colloid of the thyroid gland • Oxyphil cells of the parathyroid glands • Cells of the adrenal cortex and their hormonal zones • β-, α-, and δ-cells of the pancreatic islets and their hormones 		1

15.3	Physiology <ul style="list-style-type: none"> • Mechanisms of hormone secretion and principles of feedback regulation • Hormonal regulation of carbohydrate, lipid, and water–electrolyte metabolism • Stress responses and the hypothalamic–pituitary–adrenal axis • Regulation of calcium–phosphate metabolism (PTH, calcitonin, vitamin D) • 		2
15.4	Pathology <ul style="list-style-type: none"> • Disorders of hormone secretion • Inflammatory and autoimmune processes • Tumor processes • Semiology of endocrine system disorders: metabolic disturbances; hypofunction syndromes; hyperfunction syndromes; disorders of carbohydrate metabolism • 		4
15.5	Pharmacology <ul style="list-style-type: none"> • Thyroid hormone preparations • Glucocorticosteroids (GCS) • Mineralocorticoids • Insulins (short-acting, ultra-short, intermediate, long-acting) • Oral hypoglycemic agents 		2
Hematopoietic System			
16.1	Anatomy <ul style="list-style-type: none"> • Structure of bone marrow (red and yellow) • Anatomy of immune-hematopoietic organs (lymph nodes, spleen, thymus) 		1
16.2	Histology <ul style="list-style-type: none"> • Embryonic development • Hematopoietic lineages (erythroid, granulocytic, megakaryocytic) • Microstructure of the spleen (white and red pulp) • Structure of lymph nodes (cortex, medulla, follicles) 		1
16.3	Physiology <ul style="list-style-type: none"> • Gas-transport function of blood • Immune function of blood • Hemostasis and fibrinolysis 		2
16.4	Pathology <ul style="list-style-type: none"> • Disorders of hematopoiesis • Coagulation disorders • Proliferative processes • Immune disturbances • Semiology of hematologic disorders: • Anemic syndrome 		4

	<ul style="list-style-type: none"> • Hemolytic syndrome • Iron-deficiency syndrome • Hemorrhagic syndrome (platelet and coagulation types) • Leukocytosis and proliferative syndromes • Leukopenic syndrome • Lymphadenopathic syndrome 		
16.5	<p>Pharmacology</p> <ul style="list-style-type: none"> • Drugs affecting erythropoiesis • Drugs affecting leukopoiesis • Drugs affecting platelets • Anticoagulants • Other drug groups 		2
Urinary System			
17.1	<p>Anatomy</p> <ul style="list-style-type: none"> • Structure of the kidneys (cortex, medulla, calyx–pelvis system) • Anatomy of the ureters and their peristalsis • Structure of the urinary bladder and sphincter apparatus • Anatomy of the urethra and age- and sex-related features 		2
17.2	<p>Histology</p> <ul style="list-style-type: none"> • Embryonic development • Structure of the nephron (glomerulus, afferent and efferent arterioles) • Proximal and distal convoluted tubules • Loop of Henle and its role in urine concentration • Collecting ducts • Interstitial cells of the kidney and nephron vascular network 		2
17.3	<p>Physiology</p> <ul style="list-style-type: none"> • Filtration, reabsorption, and secretion in the nephron • Maintenance of acid–base balance • Regulation of water balance (ADH and aldosterone) • Renin–angiotensin–aldosterone system (RAAS) 		2
17.4	<p>Pathology</p> <ul style="list-style-type: none"> • Glomerular disorders • Tubular disorders • Obstructive conditions • Renal vascular disorders • Semiology of urinary system disorders: • Mechanisms of edema formation • Localization of edema, changes in body weight and diuresis • Clinical syndromes (urinary, dysuric, nephrotic, nephritic) 		4

	<ul style="list-style-type: none"> • Renal colic and its mechanisms • Hematuria and its diagnostic significance • Oligoanuria and reduced filtration • Renal hypertension and the role of RAAS • Acute and chronic renal failure • Infectious-inflammatory syndromes (cystitis, pyelonephritis) 		
17.5	Pediatric Features <ul style="list-style-type: none"> • Immaturity of renal concentrating ability and its effect on water balance • Reduced glomerular filtration rate in newborns and age-related changes • Anatomical differences (short ureter, horizontal kidney position) 		1
17.6	Pharmacology <ul style="list-style-type: none"> • Diuretics • Drugs affecting RAAS • Antibacterial agents 		2
Skin and Soft Tissues			
18.1	Anatomy <ul style="list-style-type: none"> • Structure and function of the skin, including barrier function and thermoregulation • Structure and function of skin cells and tissues, including sweating 		1
18.2	Histology <ul style="list-style-type: none"> • Embryonic development, maturation of fetal skin, and neonatal changes • Histological structure of the epidermis (keratinocytes, melanocytes) • Basement membrane and dermal–epidermal junction • Collagen and elastic fibers of the dermis 		1
18.3	Physiology <ul style="list-style-type: none"> • Repair, regeneration, and age-related changes • Protective mechanisms of the skin and normal flora 		1
18.4	Pathology <ul style="list-style-type: none"> • Inflammatory processes • Infectious processes • Traumatic injuries • Semiology of skin and soft tissue disorders: primary and secondary skin lesions; types of pruritus and mechanisms; skin and soft tissue infiltration; changes in hair and nails 		1
18.5	Pediatric Features <ul style="list-style-type: none"> • Thin epidermis, low barrier function, high hydration • Skin blood supply in children 		1
18.6	Pharmacology		1

	<ul style="list-style-type: none"> • Anti-inflammatory drugs • Mechanism of action of topical glucocorticosteroids, their effects on inflammation and immune response; indications; adverse effects with prolonged use 		
Musculoskeletal System			
19.1	<p>Anatomy, Physiology, Histology</p> <p>Bones</p> <ul style="list-style-type: none"> • Macrostructure of long and flat bones • Structure of osteons and role of osteocytes • Structure and function of the periosteum <p>Joints</p> <ul style="list-style-type: none"> • Structure of joints (surfaces, capsule, ligaments) • Synovial membrane and its functions <p>Muscles</p> <ul style="list-style-type: none"> • Structure of striated muscle (sarcomere, actin–myosin) • Motor unit and its role in movement • Regulation of muscle contraction 		2
19.2	<p>Pathology</p> <ul style="list-style-type: none"> • Inflammatory processes • Degenerative changes • Disorders of bone metabolism • Trauma • Semiology: arthralgic, arthritic, degenerative (arthrosis) syndromes; signs of fractures 		2
19.3	<p>Pediatric Features</p> <ul style="list-style-type: none"> • Growth plates • Bone elasticity and its effect on injury patterns • Displacement of bone structures without fracture • Relative ligamentous weakness and joint instability • Age-related posture characteristic 		1
19.4	<p>Pharmacology</p> <ul style="list-style-type: none"> • NSAIDs • Glucocorticosteroids 		2
Reproductive System			
20.1	<p>Female Reproductive System (Anatomy, Physiology, Histology)</p> <ul style="list-style-type: none"> • Embryonic development, fetal maturation, and perinatal changes • Structure and functions of the uterus, fallopian tubes, and ovaries • Histological structure of the endometrium in different phases of the cycle; structure and maturation stages of ovarian follicles • Mechanisms of hormonal regulation of the menstrual cycle, including the hypothalamic–pituitary–ovarian axis, estrogens, progesterone, and the LH ovulatory surge 		1

	Physiological pregnancy		
20.2	<p>Male Reproductive System(anatomy, physiology, histology)</p> <ul style="list-style-type: none"> • Anatomy of the testes, epididymis, and prostate gland, including their structural components and functions. • Histological structure of the seminiferous tubules, including Sertoli cells, spermatogonia, and Leydig cells in the interstitium. • The process of spermatogenesis, including the stages of division and maturation of germ cells, as well as hormonal regulation via FSH, LH, and testosterone. 		1
20.3	<p>Inflammatory Processes</p> <ul style="list-style-type: none"> • Inflammatory processes of the pelvic organs, including endometritis, salpingitis, and salpingo-oophoritis, and their pathophysiological mechanisms. • Clinical and morphological features of epididymitis and orchitis, including infiltration, edema, and impaired reproductive organ function. • Consequences of inflammatory processes in the reproductive system, including the risk of scarring, fertility disorders, and complications. 		1
20.4	<p>Structural Changes</p> <ul style="list-style-type: none"> • Morphological manifestations of hyperplasia and atrophy in the reproductive organs, along with explanations of their pathogenetic mechanisms. • Formation of cysts, including their origin, structure, and impact on organ function. • Processes of fibrosis, including replacement of normal tissue with connective tissue, and the resulting consequences for reproductive function. • Adverse drug effects on the reproductive system. 		1
Multisystem Processes			
21.1	<p>Physiology</p> <ul style="list-style-type: none"> • Systemic regulation of homeostasis (nervous, endocrine, and immune systems). • Main stages of the inflammatory response. • Mechanisms of the immune response (innate and adaptive). • Major pathways of protein, lipid, and carbohydrate metabolism. 		4
21.2	<p>Pathology</p> <ul style="list-style-type: none"> • Inflammation. • Immune reactions. • Metabolic disorders. • Shock and multiple organ failure. • Systemic inflammatory response. 		4

	<ul style="list-style-type: none"> • Semiology and syndromes of multisystem diseases: signs of tissue hypoperfusion; signs of systemic intoxication; allergic symptoms. • Metabolic disturbances; septic syndrome; multiple organ dysfunction syndrome (MODS); disseminated intravascular coagulation (DIC). • Anaphylactic shock; hyperthermic syndrome (heat stroke); hypothermic syndrome. 		
21.3	Pharmacology <ul style="list-style-type: none"> • Antibacterial therapy. • Vasopressors. • Antidotes. 		2
	Overall		150
Block 2: Assessment of Practical Skills			
1	Cardiovascular System Assessment <ul style="list-style-type: none"> • Evaluation of cardiovascular function (determination of cardiac borders, pulse, blood pressure, signs of congestion, edema, cyanosis). • Cardiac auscultation: valve auscultation points, heart sounds, heart murmurs. 	1	1
2	ECG Interpretation <ul style="list-style-type: none"> • Normal ECG. • ECG in acute coronary syndrome (ACS). • ECG in cardiac arrhythmias. 	1	1
3	Physical Examination of the Lungs <ul style="list-style-type: none"> • Inspection, percussion, auscultation, assessment of chest excursion. • Pathophysiological processes in acute respiratory failure (ARF) and obstructive syndromes. 	1	1
4	Interpretation of Laboratory Tests in Hematologic Disorders <ul style="list-style-type: none"> • Anemias, leukemias, hemorrhagic diatheses. • Disorders of the immune complement system, types of allergic reactions. 	1	1
5	Assessment of the Urinary System <ul style="list-style-type: none"> • Palpation, edema assessment, Pasternatsky's sign. • Interpretation of urinalysis (UA), blood/urine biochemistry, calculation of GFR. 	1	1
6	Examination of the Abdominal Organs <ul style="list-style-type: none"> • Palpation, percussion of the liver and spleen. • Signs of peritoneal irritation. • Palpation points relevant to specific pathologies 	1	1
7	Basics of Radiology <ul style="list-style-type: none"> • Determining cardiac configuration on chest X-ray. • Reading a standard chest radiograph (areas of opacity, lucency, round-shadow syndrome, infiltrate, atelectasis, pneumothorax). • Radiologic semiotics of bone fractures. 	1	1
8	Interpretation of Laboratory Tests	1	1

	<ul style="list-style-type: none"> • Complete blood count (CBC), urinalysis (UA), blood biochemistry, hormones, acid–base balance (pH, pCO₂, HCO₃⁻, anion gap). • Establishing a syndromic diagnosis. 		
9	Microscopic Slide <ul style="list-style-type: none"> • Identification of the organ, tissue layers, and cell types. 	1	1
10	Macroscopic Specimen <ul style="list-style-type: none"> • Brief description and morphological diagnosis. 	1	1
	Overall	10	10
	Overall	160	160