Ministry of science and high education RF Ulyanovsk State University	Form	
F-Educational plan of the dicipline		

APPROVED BY
by the decision of the Academic Council of the USU
Institute of Medicine, Ecology and Physical Culture
18.05.2022 Record No. 9/239
Chairman Midlenko V.I.
(Signature, Name)
«18» May 2022.

EDUCATIONAL PLAN

Discipline	Physiology of visceral system
Faculty	Medical faculty of T.Z. Biktimirov
Name of department	Physiology and Pathophysiology
Course	Second

Direction (specialty) 31.05.01 General medicine
the code of the direction (specialty), full name
Orientation (profile/specialty) not provided

Form of training full-time
full-time, part-time, part-time (specify only those that are being implemented)
Date of introduction into the academic process at Ulyanovsk State University
«1» 09 2022

Revised at the Department meeting, Record No. 13 of 17 «June» 2023
Revised at the Department meeting, Record No. ____ of ____ «____» 20
Revised at the Department meeting, Record No. ____ of ____ «____» 20
Revised at the Department meeting, Record No. ____ of ____ «____» 20

Information about the authors:

Initials	Abbreviation of the department	Degree, scientific rank
Gening T.P.	Physiology and Pathophysiology	Head of the Department, Dr.Bio.Sci., professor
Abakumova T.V.	Physiology and Pathophysiology	PhD in Biology, associate professor
Gening S.O.	Physiology and Pathophysiology	Assistance

Agreed	Agreed
Head of department, developing discipline	Head of the graduating Department
Gening / Tatyana P.Gening /	M. Vise / Marina A. Vise-Khripunova/
Signature *Full name*	*Signature* *Full name*
«18» 04 2022 г.	«18» 05 2022 г.

The purpose of the Course

laws of functioning and mechanisms of their regulation of the interaction between each other and with environmental factors, on the physiological basis of clinical and physiological methods of research used in functional diagnosis and the study integrative human activity.

Objectives:

the formation of students ' systematic approach to understanding the physiological mechanisms underlying interaction with environmental factors and implementation of adaptive strategies of the human body, the implementation of the normal functions of the human body from the standpoint of the theory of functional systems;

the study of the methods and principles of the research assessment of the state regulatory and homeostatic systems of the organism in the experiment, taking into account their applicability in clinical practice;

teaching students methods of evaluation of human functional state, state regulators and homeostatic in different types of purposeful activity;

formation bases of clinical thinking based on the analysis of the nature and structure interorganic and intersystem relations from the position of integrated physiology for future practical activities of the doctor.

2. PLACE OF THE SUBJECT IN THE STRUCTURE OF GEP:

The discipline "Physiology of Visceral Systems" refers to the basic part of B1.0.51 of the main professional educational program. For its successful development, knowledge of biochemistry, anatomy, histology, embryology, cytology, embryonic development of body tissues and normal physiology, the practice of obtaining primary professional abilities and skills, including primary abilities and skills of research activities (Care of therapeutic and surgical sick. (Part 1), Clinical practice (Care of therapeutic and surgical patients (Part 2), assistant to the nursing staff. "Physiology of visceral systems" forms a knowledge base for the subsequent study of pathophysiology, clinical pathophysiology, neuroanatomy, propaedeutics of internal diseases, the basics of functional and laboratory diagnostics, pathological anatomy, pathological anatomy, pathophysiology of extreme conditions, anesthesiology, intensive care and intensive care, forensic medicine, surgical gastroenterology and endoscopy and the preparation and passing of the state exam, hygiene, endocrinology, phthisiology, psychology and pedagogy of medical practice, obstetrics and gynecology, diagnosis and treatment of extrapulmonary tuberculosis, modern biomedical technologies, nanotechnology in medicine, a biopsychosocial approach to medical rehabilitation, the practical application of the international classification of functioning in rehabilitation for various pathologies.

3. LIST OF EXPECTED RESULTS OF INSTRUCTION ON THE SUBJECT (UNIT), CORELATED WITH PLANNED RESULTS OF COMPLETING THE PROGRAM

The study of the subject «Physiology of Visceral Systems» within the completion of the educational program is directed towards the formation of the following general and professional competences in students:

Code and name of the general professional competence	Code and name of the indicator of achievement of general professional competence
GPC-5, able to assess morphofunctional, physiological conditions and pathological	**Know:** structure, topography and development of cells, tissues, organs and systems of the body in interaction with their

processes in the human body to solve professional problems	normal function, anatomical and physiological, age-sex and individual characteristics of the structure and development of a healthy and large organism; the structure of the human body in relation to function, the functional systems of the human body, their regulation and self-regulation when exposed to the external environment is normal; physicochemical essence of the processes occurring in a living organism at the molecular, cellular, tissue and organ levels; basic patterns of development and vital activity of the organism based on the structural organization of cells, tissues and organs; histo-functional features of tissue elements, methods of their study. **be able to:** 1. use educational, scientific, popular science literature, the Internet for professional activities, 2. use physical, chemical and biological equipment; work with magnifying equipment (microscopes, optical and simple loupes); to give a histophysiological assessment of the state of various cellular, tissue and organ structures; interpret the results of the most common methods of functional diagnostics used to identify pathologies of the blood, heart and blood vessels, lungs, kidneys, liver and other organs and systems; evaluate the results of electrocardiography; spirography; thermometry; hematological indicators; to distinguish in blood serum the normal values of the levels of metabolites (glucose, urea, bilirubin, uric acid, lactic and pyruvic acids, etc.), to register an ECG in experimental animals and humans, to calculate and analyze the leukocyte formula; determine and evaluate the results of electrocardiography; spirography; thermometry; hematological parameters. **own:** methods of assessing the physiological state of the patient; methods of physical examination of the patient.

4. Volume of the subject

4.1. Volume of the subject in credit points (total): 2 credit points

4.2. On types of academic workload (in hours):

Type of academic work	Number of hours (form of education Full-time)	
	Total according to the plan	Including on semesters
		№semester 4
1	2	4
Work of students with a teacher	54	54
Classes:		
lectures	-	-

practical classes and seminars	54	54
lab classes (practical lessons)	-	-
Self-study work	18	18
Concurrent control (number and type: a test, a colloquium, a report)	5 colloquiums	5 colloquiums
Course paper		
Types of intermediate attestation (examination, test)	test	test
Total number of hours on the subject	72	72

4.3. Contents of the discipline (module). Distribution of hours on themes and kinds of study: Number of hours – 72h

The form of training: full time

Name of sections and themes	Total	Activity format					
		Classroom studies			Interactive classes	Self-study work	Form of current control
		lect.	pract. cl.	Laboratory work			
1	2	3	4	5	6	7	8
Section 1. Regulation of physiological functions							
1.1. Regulation of physiological functions. The internal environment of the human body. Principles of maintaining the constancy of the internal environment. Self-regulation. Functional systems of the body.	2					2	Questions in the final lesson. Interview
1.2. Nervous regulation of human vegetative functions.	2					2	Questions in the final lesson. Interview
1.3. Humoral regulation of human physiological processes.	1					1	Questions in the final lesson. Interview
1.4. Endocrine glands. Hormone-producing cells outside the gland.	6		6		6		Questions in the final lesson. Interview
Section 2. Functional homeostasis systems							
2.1. Human blood circulation. The	6	-	6	-	6		Questions in the final lesson.

structure and function of the heart.							Interview
2.2. Heart physiology. Methods for assessing cardiac activity.	4		3	-	3	1	Questions in the final lesson. Interview
2.3. Regulation of the heart.	4		3	-	3	1	Questions in the final lesson. Interview
2.4. Microcirculation processes	2					2	Questions in the final lesson. Interview
2.5. Functional system to maintain the optimal level of blood pressure for metabolism	4	-	3	-	3	1	Questions in the final lesson. Interview
2.6. Physiology of respiration	4	-	3		3	1	Questions in the final lesson. Interview
2.7. Human digestion. Morphofunctional organization of the digestive system. Physiology in the mouth and stomach.	5	-	3	-	3	2	Questions in the final lesson. Interview
2.8. Human digestion. Secretion and absorption in the digestive tract. 2.8. Human digestion. Secretion and absorption in the digestive tract.	7	-	6	-	6	1	Questions in the final lesson. Interview
2.9. Allocation Physiology	3	-	3		3		Questions in the final lesson. Interview
2.10. The exchange of substances and energy in the human body.	4		3		3	1	Questions in the final lesson. Interview
2.11. Heat exchange and thermoregulation.	1				1	1	Questions in the final lesson. Interview
Section 3. Homeostasis. The internal environment of the body.							
3.1. Blood, lymph and extracellular fluid are components of the	10		9		9	1	Questions in the final lesson. Interview

internal environment of the human body.							
3.2. Protective blood function. Hemostasis. Human immunophysiology.	4		3		3	1	Questions in the final lesson. Interview
Practical skills	3		3				
Total:	72	-	54	-	54	18	

If it is necessary to use partially or exclusively distance learning technologies in the educational process, it should be noted that the total number of hours (c.u.) set by the Department of discipline/specialty for each discipline/practice remains unchanged and is implemented in full. In this case, in the corresponding section of the educational program the total number of hours of work with students in accordance with the educational plan is allocated and the number of hours for conducting classes in a remote format using e-learning (online courses, lectures and seminars in videoconference mode, virtual practical classes, laboratory work in the form of virtual analogues, calculation and graphic works, individual tasks in the electronic information and educational environment, etc.) Training and industrial practice for all areas of discipline/specialties of all forms of training can be partially or fully implemented in a remote format.

5. COURSE CONTENT

Section 1. Regulation of physiological functions.

1.1. Regulation of physiological functions. The internal environment of the human body. Principles of maintaining the constancy of the internal environment. Self-regulation Functional systems of the body.

1.2. Nervous regulation of human vegetative functions.

1.3. Humoral regulation of human physiological processes.

1.4. Endocrine glands. Hormone-producing cells outside the gland.

Physiology of endocrine glands.

Physiology of endocrine glands and their role in the formation of functional systems of the body.

The mechanism of action of hormones.

Methods of studying the endocrine glands.

The hypothalamic-hypophysis system.

Thyroid. Parathyroid. Endocrine function of the pancreas. The adrenal glands. Sex glands. Epiphysis Thymus.

Age features of the endocrine system.

Section 2. Functional systems for maintaining homeostasis.

2.1. Human blood circulation. Heart structure and function

Heart physiology.

The physiological properties of the heart muscle.

Cardiac cycle and its phases.

Hemodynamic functions of the heart.

2.2. Physiology of the heart.

Methods for assessing cardiac activity.

Heart sounds.

Phono-, ballisto-, echo-, vector- and electrocardiography.

2.3. Regulation of the heart.

Autoregulation, nervous, humoral regulation.
Reflexes of the heart.
Integration of mechanisms regulating the work of the heart.
2.4. Microcirculation processes.
Methods of research microcirculation.
2.5. Functional system to maintain the optimal level of blood pressure for metabolism.
Basic laws of hemodynamics
Changes in blood pressure, resistance and blood flow in different parts of the bloodstream.
Arterial and venous pulse.
Regulation of blood circulation.
Regional blood circulation.
Methods of studying organ circulation (occlusive, plethysmography, ultrasound and electromagnetic flowmetry).
Vasodomotor center, vasomotor nerves.
Nervous and humoral effects on vascular tone.
Pressor and depressor reflexes.
Basic tone.
Features and regulation of capillary blood flow
Functional features of the pulmonary circulation, coronary blood flow
Factors of a healthy lifestyle, preventing the circulatory system.
Age features of the circulatory system.
Changes in organ circulation during muscular load, eating, pregnancy, hypoxia, stress and other conditions.
2.6. Physiology of respiration. External breathing The mechanism of inhalation and exhalation.
Stages of breathing.
The mechanism of the first breath. Respiratory movements in the embryonic period.
Pressure in the pleural cavity.
Elastic properties of the lungs.
Spirometry, spirography, pneumotachography.
2.7. Human digestion. Morphofunctional organization of the digestive system. Functional system of digestion and the place in it of the processes of digestion.
Digestion is the main component of FUS, maintaining a constant level of nutrition in the body.
Digestion in the mouth.
Swallowing, its phases, methods of study, regulation.
Nutritional motivation. The physiological basis of hunger and saturation.
Food motivation I. P. Pavlov about the food center.
Eating regulation.
Age features of the digestive system.
2.8. Human digestion. Secretion and absorption in the digestive tract.
2.9. Physiology selection.
The main processes occurring in the kidney: filtration, secretion.
Regulation of urination and urination.
Adaptive changes in kidney function under various environmental conditions.
Skin as an excretory organ. Functions of sebaceous and sweat glands, regulation of their activity.
Physiology selection. Clinical methods for the study of renal function. Regulation of renal function.
2.10. The exchange of substances and energy in the human body.
Metabolism and energy.
Physiology of metabolism and energy.

Plastic and energy role of nutrients.
Caloric and respiratory coefficients.
Main and working exchange.
The concept of water balance.
Energy costs of the body with different types of labor.
Age features of the metabolic system.
Physiological basis of nutrition.
2.11. Heat exchange and thermoregulation.
Heat control.
System mechanisms of thermoregulation and heat transfer.
Mechanisms of hardening of the body.
Age features of the thermoregulation system.
Section 3. Homeostasis. The internal environment of the body.
3.1. Blood, lymph and extracellular fluid are components of the internal environment of the human body.
Lymphatic system, its structure and function.
Lymphatic formation and mechanisms of its regulation. Factors that provide lymph flow and mechanisms of its regulation. Lymph, its composition, quantity, function, physiological value.
Extravascular fluid media of the body (interstitial, cerebrospinal, synovial, pleural, peritoneal, fluid medium of the eyeball, mucus) and their role in ensuring the vital activity of the body cells.
Blood physiology
The main constants of blood and self-regulating mechanisms for their maintenance.
Protective blood function.
Blood groups. Rh factor.
Mechanisms of blood coagulation.
3.2. Protective blood function. Hemostasis. Human immunophysiology.
The body and its protective systems.
Factors that ensure the integrity of the body. Barriers to the external and internal environment of the body.
Immunity and its types.
Protective reflexes.

6. TOPICS OF PRACTICAL CLASSES AND SEMINARS (FOR DISCUSSING AND SELF-PREPARING OF STUDENTS)

Section 1. Regulation of physiological functions.
Topic 1. Endocrine glands. Hormone-producing cells outside the gland.
Section 2. Functional systems for maintaining homeostasis.
Topic 1. Human blood circulation. The structure and function of the heart.
Topic 2. Heart physiology. Methods for assessing cardiac activity.
Topic 3. Regulation of the heart.
Topic 4. Microcirculation processes.
Topic 5. Functional system to maintain the optimal level of blood pressure for metabolism.
Topic 6. The physiology of respiration.
Topic 7. The physiology of digestion. Morphofunctional organization of the digestive system. Methods for studying the functions of the gastrointestinal tract. Digestion in the mouth and stomach.
Topic 8. The physiology of digestion. Motility of the gastrointestinal tract and its regulation. Absorption in different parts of the digestive tract.

Topic 9. Allocation physiology.
The main processes occurring in the kidney: filtration, secretion. Regulation of urination and urination. Adaptive changes in renal function in various environmental conditions.
Skin as an excretory organ. Functions of sebaceous and sweat glands, regulation of their activity.
Physiology selection. Clinical methods for the study of renal function.
Topic 10. The exchange of substances and energy in the human body.
Section 3. Homeostasis. The internal environment of the body.
Topic 1. Blood physiology. Formed elements of blood. Erythrocyte physiology. Respiratory blood function.
Topic 2. Blood physiology. Leukocyte physiology. Physical and chemical properties of blood.
Topic 3. Blood physiology. Blood coagulation The doctrine of blood types.

7. LABORATORY CLASSES – NO

8. SUBJECTS OF COURSE PAPERS, TESTS, ESSAYS - NO

9. QUESTIONS FOR CREDIT ON DISCIPLINE "PHYSIOLOGY OF VISCERAL SYSTEM"

1. Excitability of the heart muscle.
2. Contractility of the heart muscle. Extrasystole.
3. Conduction of the heart muscle. Holding excitement in the heart.
4. Heart Automation.
5. Conductive system of the heart. The experience of Stanius.
6. The ratio of excitation, contraction and excitability in different phases of the cardiac cycle.
7. Self-regulation of the heart.
8. Nervous regulation of the heart.
9. Reflexes of the heart.
10. Humoral effects on the work of the heart.
11. Integration of mechanisms regulating the work of the heart.
12. Heart beat, heart sounds and their origin.
13. ECG, vector cardiography.
14. Phonocardiography.
15. Phases of the heart cycle.
16. Classification of the cardiovascular system
17. The basic laws of hydrodynamics and their use to explain the physiological patterns of blood movement in vessels
18. Factors that ensure the movement of blood through the vessels.
19. Change in resistance, blood pressure and blood flow velocity in various parts of the vascular bed.
20. Arterial and venous pulse.
21. Blood circulation time
22. Blood pressure and methods for measuring it (according to Korotkov and Riva-Rochi).
23. Regulation of blood pressure.
24. Capillary blood flow, microcirculation.
25. The importance of respiration for the body.
26. The main stages of breathing.
27. External respiration.
28. The mechanism of ventilation.
29. Respiratory muscles, the effect of their contractions on the volume of the chest.
30. The mechanism of inhalation and exhalation.
31. Pressure in the pleural cavity.
32. The elastic properties of the lungs.
33. Surfactant. Its nature and significance.
34. The mechanism of active and passive inhalation and exhalation.
35. Spirometry, spirography, pneumatography.
36. Physiology of the respiratory tract.
37. Gas exchange in the lungs. Composition of inhaled, exhaled, alveolar air.

38. Blood gas transport.
39. Oxyhemoglobin dissociation curve, factors affecting the course of the curve.
40. Gas exchange in tissues.
41. Respiratory Center (N.A. Mislavsky). Automation of the respiratory center.
42. The role of mechanoreceptors of vagus lung and afferent fibers in the regulation of respiration.
43. Reflex self-regulation of respiration. The mechanism of change of respiratory phases.
44. The main physiological mechanisms of changes in respiration when climbing to a height.
45. Goering-Breyer reflexes. Respiration at high and low atmospheric pressure.
46. The role of humoral factors in the regulation of respiration.
47. The effect on the respiratory center of the gas composition and the pH of the blood and cerebrospinal fluid.
48. Peripheral and central chemoreceptors.
49. Regulatory effects on respiration from the hypothalamus, limbic system, and cerebral cortex.
50. Protective respiratory reflexes.
51. Functional breathing system, ensuring the constancy of the gas composition of the blood.
52. Digestion is the main component of a functional system that maintains a constant level of nutrition in the body.
53. The importance of digestion, the function of the digestive tract.
54. Types of digestion depending on the features of hydrolysis and its localization.
55. Methods of studying the functions of the digestive tract (I.P. Pavlov).
56. Methods of studying the activity of the digestive system in humans.
57. Digestion in the oral cavity.
58. The amount, composition and properties of saliva.
59. Salivation mechanism.
60. Swallowing and its phases.
61. Digestion in the stomach. Gastric juice, its composition and properties.
62. Regulation of gastric secretion. Secretory nerves of the stomach.
63. The effect of humoral factors on the work of the gastric glands.
64. The adaptive nature of gastric secretion.
65. Exocrine pancreatic activity. The amount, composition and properties of pancreatic juice.
66. Nervous and humoral regulation of pancreatic secretion.
67. The role of the liver in digestion.
68. The barrier role of the liver.
69. Digestion in the jejunum and ileum.
70. The secretion of intestinal juice, its composition, properties, regulation.
71. Oral and membrane hydrolysis of food substances.
72. Digestion in the colon.
73. Types of contraction of the stomach. Their role in gastric digestion.
74. Evacuation of gastric contents into the intestines.
75. The effect of gastric and intensin hormones on the motor function of the stomach.
76. Motor activity of the small intestine.
77. Types and mechanism of absorption of substances through the membrane.
78. Absorption in various parts of the digestive tract.
79. Absorption of water and minerals.
80. Absorption of hydrolysis products of proteins, fats and carbohydrates.
81. Parietal digestion.
82. The general concept of metabolism in the body.
83. The processes of assimilation and dissimilation of substances.
84. Plastic and energy role of substances.
85. Balance of receipt and consumption of substances.
86. Nitrogen balance. Positive and negative nitrogen balance.
87. Regulation of the metabolism of nutrients in the body.
88. The energy balance of the body.
89. The caloric value of food.
90. Direct and indirect calorimetry.
91. Calorimetric equivalent and its meaning.
92. Respiratory rate and its value.
93. The main exchange, its size and factors influencing it.
94. Hess law

95. The laws of the preparation of the diet.
96. The formation and secretion of hormones, their transport by blood, the effect on cells and tissues.
97. The relationship and interaction of the endocrine glands.
98. Pituitary hormones. Functional relationships of the hypothalamus with the pituitary gland. The role of the pituitary gland in the regulation of endocrine organs.
99. Thyroid gland.
100. The parathyroid glands and the role of thyrocalcitonin in the regulation of calcium and phosphorus metabolism.
101. Pancreatic hormones.
102. Adrenal hormones.
103. Sex hormones.
104. Excretory organs.
105. Nephron as a structurally functional unit of the kidney.
106. The main processes occurring in the kidney: filtration, reabsorption, secretion.
107. The formation of primary urine, its composition.
108. Features of the mechanisms of reabsorption of water, salts and organic substances. The concept of selective and mandatory reabsorption.
109. The formation of final urine.
110. Mechanisms for regulating the activity of the kidneys.
111. The effect of blood pressure and blood supply to the tubules on the formation of urine.
112. Humoral regulation of kidney activity.
113. Reflex mechanisms.
114. The role of the spinal cord and brain in the regulation of kidney activity (K.M. Bykov).
115. The participation of the kidneys in the FUS, ensuring the constancy of the osmotic pressure of the blood, the volume of body fluid.
116. Heat production. Metabolism as a source of heat. The role of individual organs in heat production. Physiological mechanisms of heat transfer.
117. Heat transfer. Methods of heat transfer from the surface of the body. Physiological mechanisms of heat transfer.
118. The main functions of the blood.
119. The composition of human blood.
120. Physiological constants of blood and the mechanisms of their maintenance.
121. Blood plasma. Electrolyte composition. Osmotic and oncotic blood pressure.
122. Erythrocytes: structure and function.
123. The concept of erythron.
124. Nervous and humoral regulation of erythropoiesis.
125. White blood cells, their types, number, function.
126. The concept of leukocytosis and leukopenia.
127. Leukocyte formula.
128. Regulation of leukopoiesis.
129. Hemoglobin and its compounds. Platelets, structure, quantity.
130. ESR mechanism.
131. Definition of a color indicator.
132. The process of blood coagulation and its significance. Theory of A.A. Schmidt.
133. Modern ideas about the main factors involved in blood coagulation.
134. Blood coagulation phases.
135. The concept of retraction and fibrinolysis.
136. Blood coagulation and anticoagulation systems.
137. Factors that accelerate and slow down blood coagulation.
138. The doctrine of blood groups.

10. SELF-STUDY WORK OF STUDENTS

Form of education Full-time

Independent work is made up of preparing for classes on questions for each lesson and preparation for intermediate control on questions for offset and examination. The following educational technologies are used in the organization of independent work of classes: Auditorium independent work on the discipline is performed on practical exercises under the direct guidance of the teacher and on his instructions. The workshop on normal physiology contains various

experimental tasks in accordance with all the main sections of the theoretical course and is independently carried out in the laboratory of the Department of Physiology, equipped with laboratory equipment. As part of the course, students solve virtual problems - this is a simulator for independent work. Outside classroom independent work is performed by the student on the instructions of the teacher, but without his direct participation. The main types of independent work of students without the participation of teachers are: the formation and assimilation of the content of lecture notes on the basis of textbooks recommended by the lecturer, including information educational resources (electronic textbooks, electronic libraries, etc.); preparation for practical work, their design.

№	Name of the section / subject	Types of SSW	Total number of hours	Current control
1.	Homeostasis. The internal environment of the body. Regulation of physiological functions: 1) Blood circulation in the organs. 2) Lymph, physiological significance. Lymph formation. 3) Physiology of hunger and satiety. Balanced diet. 4) Skin. Skin functions. 5) Epiphysis. Thymus. Sex glands. 6) Physiology of pain, anesthesia.	Preparation for classes (PC) Preparation for current control (PCC)	18	Oral survey
TOTAL hours per semester:			18	
Form of knowledge control on the independent study of the subject: a colloquium, credit.				

Practical skills

For self-study the students are recommended basic and additional educational literature and educational and methodical manuals, published at UlSU. Workshop on normal physiology contains various experimental tasks in accordance with all the main sections of the theoretical course and independently performed in the laboratory of the Department of physiology, with laboratory equipment. In this course students solve virtual problem - it is the simulator for independent work.

Form of control of knowledge by self-guided study of the subject: **the colloquium, a credit and an examination**.

11. EDUCATIONAL-METHODICAL AND INFORMATION SUPPORT OF DISCIPLINE

a) List of recommended literature

principal literature

1.Normal physiology : education guidance for students of medical faculty. Part 2. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood / T. P. Gening, T. V. Abakumova, N. L. Mikhailova, E. N. Kadysheva ; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - 2nd ed. - Электрон. текстовые дан. (1 файл : 5,55 Мб). - Ulyanovsk : ULSU, 2018. - Текст на англ. яз. - Загл. с экрана. - Текст : электронный. http://lib.ulsu.ru/MegaPro/Download/MObject/1202

2. Лапкин, М. М. Избранные лекции по нормальной физиологии = Selected Lectures on Normal Physiology : учебное пособие на русском и английском языках / М. М. Лапкин, Е. А. Трутнева. - Москва : ГЭОТАР-Медиа, 2021. - 544 с. - 544 с. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970459720.html

additional literature

1. Gening T. P. Workshop on physiology of visceral system : methodological guidance for students of medical faculty / T. P. Gening, T. V. Abakumova, S. O. Gening. - Ulyanovsk : UlSU, 2022. - 25 p. - На англ. яз.; Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/11500. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

2.Gening T. P. Physiology of visceral systems : Education guidance for students of medical faculty / T. P. Gening, T. V. Abakumova. - Ulyanovsk : UlSU, 2019. - На англ. яз.; Загл. с экрана; Неопубликованный ресурс. - Электрон. текстовые дан. (1 файл : 1,46 Мб). - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/1929. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

educational literature

1.Gening T. P. Methodical instructions for organizing independent work of students in the discipline "Physiology of visceral system" for specialty 31.05.01 «General medicine» / T. P. Gening, T. V. Abakumova, S. O. Gening. - Ulyanovsk : UlSU, 2022. - 7 p. - На англ. яз.; Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/11502. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

AGREED:

Main Librarian	Стадольникова		18.05.2022
The position of an employee of the scientific library	Full name	signature	date

b) Professed data base, directory and search systems:

1. Электронно-библиотечные системы:

1.1. Цифровой образовательный ресурс IPRsmart : электронно-библиотечная система : сайт / ООО Компания «Ай Пи Ар Медиа». - Саратов, [2022]. – URL: http://www.iprbookshop.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.2. Образовательная платформа ЮРАЙТ : образовательный ресурс, электронная библиотека : сайт / ООО Электронное издательство ЮРАЙТ. – Москва, [2022]. - URL: https://urait.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.3. База данных «Электронная библиотека технического ВУЗа (ЭБС «Консультант

студента») : электронно-библиотечная система : сайт / ООО Политехресурс. – Москва, [2022]. – URL: https://www.studentlibrary.ru/cgi-bin/mb4x. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.4. Консультант врача. Электронная медицинская библиотека : база данных : сайт / ООО Высшая школа организации и управления здравоохранением-Комплексный медицинский консалтинг. – Москва, [2022]. – URL: https://www.rosmedlib.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО Букап. – Томск, [2022]. – URL: https://www.books-up.ru/ru/library/ . – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.6. ЭБС Лань : электронно-библиотечная система : сайт / ООО ЭБС Лань. – Санкт-Петербург, [2022]. – URL: https://e.lanbook.com – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. ЭБС Znanium.com: электронно-библиотечная система : сайт / ООО Знаниум - Москва, [2022]. - URL: http://znanium.com . – Режим доступа : для зарегистрир. пользователей. - Текст : электронный.

1.8. Clinical Collection : научно-информационная база данных EBSCO // EBSCOhost : [портал]. – URL: http://web.b.ebscohost.com/ehost/search/advanced?vid=1&sid=9f57a3e1-1191-414b-8763-e97828f9f7e1%40sessionmgr102 . – Режим доступа : для авториз. пользователей. – Текст : электронный.

1.9. База данных «Русский как иностранный» : электронно-образовательный ресурс для иностранных студентов : сайт / ООО Компания «Ай Пи Ар Медиа». – Саратов, [2022]. – URL: https://ros-edu.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

2. КонсультантПлюс [Электронный ресурс]: справочная правовая система. / ООО «КонсультантПлюс» - Электрон. дан. - Москва : КонсультантПлюс, [2022].

3. Базы данных периодических изданий:

3.1. База данных периодических изданий EastView : электронные журналы / ООО ИВИС. - Москва, [2022]. – URL: https://dlib.eastview.com/browse/udb/12. – Режим доступа : для авториз. пользователей. – Текст : электронный.

3.2. eLIBRARY.RU: научная электронная библиотека : сайт / ООО Научная Электронная Библиотека. – Москва, [2022]. – URL: http://elibrary.ru. – Режим доступа : для авториз. пользователей. – Текст : электронный

3.3. Электронная библиотека «Издательского дома «Гребенников» (Grebinnikon) : электронная библиотека / ООО ИД Гребенников. – Москва, [2022]. – URL: https://id2.action-media.ru/Personal/Products. – Режим доступа : для авториз. пользователей. – Текст : электронный.

4. Федеральная государственная информационная система «Национальная электронная библиотека» : электронная библиотека : сайт / ФГБУ РГБ. – Москва, [2022]. – URL: https://нэб.рф – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

5. SMART Imagebase : научно-информационная база данных EBSCO // EBSCOhost : [портал]. – URL: https://ebsco.smartimagebase.com/?TOKEN=EBSCO-1a2ff8c55aa76d8229047223a7d6dc9c&custid=s6895741. – Режим доступа : для авториз. пользователей. – Изображение : электронные.

6. Федеральные информационно-образовательные порталы:

6.1. Единое окно доступа к образовательным ресурсам : федеральный портал . –

URL: http://window.edu.ru/ . – Текст : электронный.

6.2. Российское образование : федеральный портал / учредитель ФГАУ «ФИЦТО». – URL: http://www.edu.ru. – Текст : электронный.

7. Образовательные ресурсы УлГУ:

7.1. Электронная библиотечная система УлГУ : модуль «Электронная библиотека» АБИС Мега-ПРО / ООО «Дата Экспресс». – URL: http://lib.ulsu.ru/MegaPro/Web. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

AGREED:

зам. нач. УИТ / Клочкова ЛВ / / 12.05.2022

Employee of the Department of information technology and telecommunications | Full name | signature | data

12. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE LIST OF EQUIPMENT USED AT PRACTICAL ACTIVITIES IN NORMAL PHYSIOLOGY

Object name, lecture hall	Material support, the availability of logistics, with a list of basic equipment	The address (location) of the object confirming the availability of material and technical support (indicating the number of such an object in accordance with the technical inventory documents)
Classroom 310 for lecture classes, with a set of demonstration equipment to ensure the presentation of illustration material on the discipline in accordance with the work program. The room is equipped with a set of student furniture for 400 seats.	Technical means: 1. Multimedia projector 2. Interactive whiteboard 3. Board classroom 4. Workplace of the teacher	Ulyanovsk 1, Universitetskaya Embankment str., Building 4., room 310
Classroom No. 209 for lecture classes, with a set of demonstration equipment to ensure the presentation of illustration material on the discipline in accordance with the work program. The room is equipped with a set of student furniture for 186 seats.	Technical means: 1. Multimedia projector 2. Interactive whiteboard 3. Board classroom 4. Educational visual aids 5. Workplace of the teacher	Ulyanovsk, 2/1, Arch.Livchak Str., room 209
Classroom number 204 for lectures, practical group (1/2 groups) classes with a set of demonstration equipment to ensure the presentation of	Technical means: 1. Multimedia equipment (TV, laptop) 2. Interactive whiteboard 3. Board classroom	Ulyanovsk, 2/1, Arch.Livchak Str., room 204, S=54,97m2

illustration material on the discipline in accordance with the work program. The room is equipped with a set of student furniture for 36 seats.	4. Shelving with educational aids 5. Workplace of the teacher 6. The device for electrophysiological research in humans Biopac Student Lab 7. A computer for conducting a virtual workshop on many topics of the course according to the work program 8. 2 working laboratory tables for educational equipment (perimeter, electrocardiograph, etc.) 9. Couch 10. Electric hand dryer 11. Electrical stimulator 12. Fridge 13. Fume hood 14. Curbstones on wheels 15. Laboratory tools (scissors, tweezers, dissecting needles, Galvani forks, pharmacy scales, scalpels, etc.) 16. Computer table 17. Table laboratory washing SLM-1N (ecoline)	
Classroom number 203 for lectures, practical group (1/2 groups) classes with a set of demonstration equipment to ensure the presentation of illustration material on the discipline in accordance with the work program. The room is equipped with a set of student furniture for 26 seats.	Technical means: 1. Classroom board 2. A stand for educational visual aids 3. Workplace of the teacher 4. A computer for conducting a virtual workshop on many topics of the course according to the work program 5. Apparatus for electrophysiological studies in humans Biopac Student Lab. 6. Computing station for data processing for analysis of PCR results in dir. real time (to Biopac Student Lab) 6. Working laboratory table for educational equipment (perimeter, electrocardiograph, etc.) 7. Electrical stimulator	Ulyanovsk, 2/1, Arch. Livchak Str., room 203, S=41,5 m²

	8. Curbstones on wheels 9. Computer table 10. A computer for conducting a virtual workshop on many topics of the course according to the work program 11 Laboratory tools (scissors, tweezers, dissecting needles, Galvani forks, pharmacy scales, scalpels, etc.)	
Classroom №205 for lectures, practical group (1/2 groups) classes with a set of tables to ensure the presentation of illustration material on the discipline in accordance with the work program. The room is equipped with a set of student furniture for 26 seats.	Technical means: 1. Classroom board 2. A stand for educational visual aids 3. Workplace of the teacher 4. A computer for conducting a virtual workshop on many topics of the course according to the work program 5. Working laboratory table for educational equipment (perimeter, electrocardiograph, etc.) 6. Electrical stimulator 7. Curbstones on castors 8. Computer table 9. Thermostat TS-80 10. Distiller DE-4-2 M 11. Centrifuge TsG-2 12 Laboratory tools (scissors, tweezers, dissecting needles, Galvani forks, pharmacy scales, scalpels, etc.) 13. Washing laboratory table SLM-1N (ecoline) 14. GP-20 sterilizer	Ulyanovsk, 2/1, Arch. Livchak Str., room 205, S=42,5 m2

LIST OF EQUIPMENT FOR EDUCATIONAL PROCESS

№	Name	Count	Planned to be
1	Electrocardiograph EK – 1	1	1
2	Electrocardiograph one/three-channel EC1T-1/3-07 "Axion"	1	1
3	Electrocardiograph one/three-channel "Axion"	1	1
4	Distiller DE-4-2 M	1	1
5	Audiometer	1	1
6	Sterilizer GP-20	1	1
7	Fridge	2	2
8	Centrifuge OPN-8	1	1

9	The stereotactic radiotherapy SEG-5	1	1
10	Centrifuge hematocrit. TT-2	-	2
11	Microscope Lumam	1	1
12	The stereoscopic microscope Leica EZ40	1	2
13	The microscope MICMED	2	2
14	Electrostimulator SP-01-AP	3	3
15	Recorder type H-3031 – 1 channel	2	2
16	A set of pipette	8	8
17	Neurological hammer	3	4
18	Spring clips – serpinas	10	10
19	The Engelmann's levers	4	4
20	Scales VK 150,1 (from 0.005 to 150 g)	1	1
21	Libra pharmacy	4	4
22	The weights from 1 mg to 500 g	1	4
23	Mechanic tonometer LD-71	6	6
24	Water thermometer	2	2
25	Phonendoscope	10	10
26	The forked electrodes	4	4
27	Polygraph for electrophysiological studies MP30 (Biopac Student Lab), expanded.	1	1
28	Hardware-software program complex "Valenta" for research	1	1
29	"Neyrovizor" system for registration and analysis of EEG, evoked potentials and physiological parameters	1	1
30	TV Daewoo 20Q3M	1	1
31	Videoplayer	1	1
32	DVD-player United 7062	4	4

LIST OF VIDEOS ON PHYSIOLOGY OF VISCERAL SYSTEMS

1 Heart physiology

1. action potentials in cardiac myocytes
2. Electrical system of the heart
3. action potentials in pacemaker cells

2 Heart physiology

2-1 Normal sinus rhythm on an ECG

2-2 Cardiology - Relationship of conduction system, ventricular contraction and ECG

2-3 Cardiovascular System Physiology - Cardiac Output (stroke volume, heart rate, preload and afterload)

3 Circulation

3-1 General overview of the RAAS system Cells and hormones

3-2 Aldosterone and ADH

3-3 Regulation of blood pressure with baroreceptors

5 Breath

2-1 How does lung volume change

2-2 The respiratory center

2-3 Oxygen movement from alveoli to capillaries

7 Digestion

1. Gastrointestinal Anatomy and Physiology
2. Digestive System Secretion part 2 Secretion of HCL and Pepsinogen in Stomach

8 Digestion

2-1 Control of the GI tract
2-2 Small intestine 1- Structure
2-3 Small intestine 2- Digestion
2-4 Small intestine 3- Absorption

10 Allocation

1. Glomerular Filtration System Urinary
2. Countercurrent multiplication in the kidney

11 Endocrine glands

2-1 Endocrine gland hormone review
2-2 Physiological concept of positive and negative feedback
2-3 Types of hormones

12 Metabolism

3-1 Overview of metabolism Anabolism and catabolism
3-2 Tissue specific metabolism and the metabolic states
3-3 Thermoregulation in the circulatory system

14 Blood

1. What's inside of blood - Lab values and concentrations
2. Hematopoiesis

15 Leukocytes and thrombocytes

2-1 The life and times of RBCs and platelets
2-2 Introduction to the immune system

Laboratory research n.16 Blood fibrillation

3-1 Primary hemostasis
3-2 Secondary hemostasis
3-3 Blood types

13. SPECIAL CONDITIONS FOR STUDENTS WITH DISABILITIES

Training students with disabilities is carried out taking into account the peculiarities of psychophysical development, individual capabilities and health of such students. Education of students with disabilities can be organized in conjunction with other students, and separately. If necessary, students from among persons with disabilities (at the request of the student) may be offered one of the following options for the perception of information, taking into account their individual psychophysical characteristics:

- for persons with visual impairment: in printed form in large print; in the form of an electronic document; in the form of an audio file (translation of educational materials into audio format); in printed form in Braille; individual consultations with the involvement of a tiflosurdoperevodchika; individual tasks and consultations.
- for persons with hearing impairment: in printed form; in the form of an electronic document; video materials with subtitles; individual consultations with the assistance of a sign language interpreter; individual tasks and consultations.
- for persons with musculoskeletal disorders: in printed form; in the form of an electronic

document; in the form of an audio file; individual tasks and consultations."

Developer		Head of Department	Tatyana P.Gening
	Signature	position	name
Developer		Docent	Tatyana V.Abakumova
	Signature	position	name
Developer		Assistant	Snezhanna O.Gening
	Signature	position	name

LIST OF CHANGES of
Educational plan of discipline "Physiology of visceral systemi"
Speciality 31.05.01. «General medicine»

№	Content of the change or a link to the attached text of the	Full name of the head of the Department developing the discipline	Signature	Date
1	Introduction of changes to item a) Recommended Literature item 11 "Educational-methodological and information support of the discipline" with the design of Appendix 1	Gening T.P.		27 of June 2023
2	Introduction of changes to item b) Professional databases, directory and reference systems item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 2	Gening T.P.		27 of June 2023

Appendix 1

11. EDUCATIONAL-METHODICAL AND INFORMATION SUPPORT OF DISCIPLINE

a) List of recommended literature

principal literature

1.**Normal physiology :** education guidance for students of medical faculty. Part 2. Physiology of Cardio-vascular system, Breath, Digestion, Excretion, Endocrine glands, Metabolism and Energy, Blood / T. P. Gening, T. V. Abakumova, N. L. Mikhailova, E. N. Kadysheva ; Ulyanovsk State University, Insitute of Medicine, Ecology and Physical culture. - 2nd ed. - Электрон. текстовые дан. (1 файл : 5,55 Мб). - Ulyanovsk : ULSU, 2018. - Текст на англ. яз. - Загл. с экрана. - Текст : электронный. http://lib.ulsu.ru/MegaPro/Download/MObject/1202

2. **Лапкин, М. М.** Избранные лекции по нормальной физиологии = Selected Lectures on Normal Physiology : учебное пособие на русском и английском языках / М. М. Лапкин, Е. А. Трутнева. - Москва : ГЭОТАР-Медиа, 2021. - 544 с. - 544 с. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970459720.html

additional literature

1. **Gening T. P.** Workshop on physiology of visceral system : methodological guidance for students of medical faculty / T. P. Gening, T. V. Abakumova, S. O. Gening. - Ulyanovsk : UlSU, 2022. - 25 p. - На англ. яз.; Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/11500. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

2.**Gening T. P.** Physiology of visceral systems : Education guidance for students of medical faculty / T. P. Gening, T. V. Abakumova. - Ulyanovsk : UlSU, 2019. - На англ. яз.; Загл. с экрана; Неопубликованный ресурс. - Электрон. текстовые дан. (1 файл : 1,46 Мб). - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/1929. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

educational literature

1.**Gening T. P.** Methodical instructions for organizing independent work of students in the discipline "Physiology of visceral system" for specialty 31.05.01 «General medicine» / T. P. Gening, T. V. Abakumova, S. O. Gening. - Ulyanovsk : UlSU, 2022. - 7 p. - На англ. яз.; Неопубликованный ресурс. - URL: http://lib.ulsu.ru/MegaPro/Download/MObject/11502. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

AGREED:

Leading specialist	Стадольникова	Стад	10.04.2023
The position of an employee of the scientific library	Full name	signature	date

Appendix 2

1. Электронно-библиотечные системы:

1.1. Цифровой образовательный ресурс IPRsmart : электронно-библиотечная система : сайт / ООО Компания «Ай Пи Ар Медиа». - Саратов, [2023]. – URL: http://www.iprbookshop.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.2. Образовательная платформа ЮРАЙТ : образовательный ресурс, электронная библиотека : сайт / ООО Электронное издательство «ЮРАЙТ». – Москва, [2023]. - URL: https://urait.ru. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.3. База данных «Электронная библиотека технического ВУЗа (ЭБС «Консультант студента») : электронно-библиотечная система : сайт / ООО «Политехресурс». – Москва, [2023]. – URL: https://www.studentlibrary.ru/cgi-bin/mb4x. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.4. Консультант врача. Электронная медицинская библиотека : база данных : сайт / ООО «Высшая школа организации и управления здравоохранением-Комплексный медицинский консалтинг». – Москва, [2023]. – URL: https://www.rosmedlib.ru. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО «Букап». – Томск, [2023]. – URL: https://www.books-up.ru/ru/library/ . – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.6. ЭБС Лань : электронно-библиотечная система : сайт / ООО ЭБС «Лань». – Санкт-Петербург, [2023]. – URL: https://e.lanbook.com. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. ЭБС **Znanium.com :** электронно-библиотечная система : сайт / ООО «Знаниум». - Москва, [2023]. - URL: http://znanium.com . – Режим доступа : для зарегистрир. пользователей. - Текст : электронный.

2. КонсультантПлюс [Электронный ресурс]: справочная правовая система. / ООО «Консультант Плюс» - Электрон. дан. - Москва : КонсультантПлюс, [2023].

3. Базы данных периодических изданий:

3.1. eLIBRARY.RU: научная электронная библиотека : сайт / ООО «Научная Электронная Библиотека». – Москва, [2023]. – URL: http://elibrary.ru. – Режим доступа : для авториз. пользователей. – Текст : электронный

3.2. Электронная библиотека «Издательского дома «Гребенников» (Grebinnikon) : электронная библиотека / ООО ИД «Гребенников». – Москва, [2023]. – URL: https://id2.action-media.ru/Personal/Products. – Режим доступа : для авториз. пользователей. – Текст : электронный.

4. Федеральная государственная информационная система «Национальная электронная библиотека» : электронная библиотека : сайт / ФГБУ РГБ. – Москва, [2023]. – URL: https://нэб.рф. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

5. Российское образование : федеральный портал / учредитель ФГАУ «ФИЦТО». – URL: http://www.edu.ru. – Текст : электронный.

6. Электронная библиотечная система УлГУ : модуль «Электронная библиотека» АБИС Мега-ПРО / ООО «Дата Экспресс». – URL: http://lib.ulsu.ru/MegaPro/Web. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

Согласовано:

Ведущий инженер	Шудренко Ю.В.		04.2023
должность сотрудника УИТиТ	Ф.И.О.	Подпись	Дата