


Ministry of science and high education of the RF Ulyanovsk State University	Form	
Educational plan of the discipline		

**APPROVED 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)*  
«18» May 2022

**EDUCATIONAL PLAN**

Discipline	Pathophysiology of extreme states
Faculty	Medical faculty of T.Z.Biktimirov
Name of department	Physiology and pathophysiology
Course	3

Direction (speciality) 31.05.01. General medicine  
*the code of direction (speciality), full name*

Orientation (profile/specialty) not provided

Form of traning \_\_\_\_\_ full-time \_\_\_\_\_


Date of introduction into the academic process at Ulyanovsk State University «1» September 2022

Revised at the Department meeting, Record No. 13 of 27 « 06 » 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 of authors:

Initials	Department	Degree, scientific rank
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AGREED	AGREED
Head of department of physiology and pathophysiology developing discipline	Head of the graduation department of hospital therapy
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« 18 » April 2022	« 11 » May 2022

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## 1. GOALS AND TASKS OF MASTERING THE DISCIPLINE:

The goals of mastering the discipline: the formation of students' scientific knowledge about the etiology and key links in the pathogenesis of extreme conditions, their types, manifestations, the principles of their treatment and prevention.

### The tasks of mastering the discipline:

- to solve the professional problems of a doctor on the basis of pathophysiological analysis of specific data on pathological processes, conditions, reactions and diseases underlying extreme conditions;
- to carry out a pathophysiological analysis of clinical, laboratory, experimental, and other data and formulate, on their basis, a conclusion about the most likely causes and mechanisms for the development of extreme conditions, the principles and methods for their detection, treatment, and prevention;
- apply the acquired knowledge in the study of clinical disciplines in the subsequent treatment and prevention activities;
- determine the role of causal factors, conditions and reactive properties of the organism in the occurrence, development and outcome of extreme conditions.

## 2. PLACE OF THE SUBJECT IN THE STRUCTURE OF MASTERING THE PROGRAM:

Academic discipline Б1.Б.ДВ.05.01 "Pathophysiology of extreme states" refers to a part of the disciplines of the choice of the curriculum, is studied in the sixth semester.

To study this discipline, the student must master such disciplines as: bioethics; biochemistry; philosophy; physics mathematics; chemistry; nanotechnologies in medicine; extreme medicine; care of surgical patients; introductory practice.

Knowledge in the discipline "Pathophysiology of extreme conditions" is necessary for the subsequent development of the following disciplines: occupational diseases, modern aspects of neurology, topical issues of hospital surgery; surgical gastroenterology and endoscopy; palliative medicine; clinical pathological anatomy; diabetology and emergency endocrinology; topical issues of HIV infection; clinical electrocardiography; Emergency Medicine; anesthesiology, resuscitation and intensive care; assistant nurse; practice in obtaining professional skills and experience in professional activities in the positions of paramedical personnel; assistant physician in a hospital; preparation for passing and passing the state exam.

## 2. LIST OF PLANNED LEARNING OUTCOMES BY DISCIPLINE (MODULE) CORRELATED WITH THE PLANNED OUTCOMES OF MASTERING THE EDUCATIONAL PROGRAM

Code and name of the implemented competence	The list of planned learning outcomes for the discipline (module), correlated with indicators of the achievement of competencies
UC -1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop	<b>To know:</b> <ul style="list-style-type: none"> <li>• etiology, pathogenesis, manifestations and outcomes of extreme states, principles of their etiological and pathogenetic therapy;</li> <li>• the importance of physical and formalized (not physical) modeling of diseases and disease states, pathological processes, states and reactions for medicine and biology in the study of pathological processes underlying ex-</li> </ul>



<p>an action strategy</p>	<p>treme conditions;</p> <p><b>Be skilled in:</b></p> <ul style="list-style-type: none"> <li>• to solve the professional problems of a doctor on the basis of pathophysiological analysis of specific data on pathological processes, conditions, reactions and diseases underlying extreme conditions;</li> <li>• conduct a pathophysiological analysis of clinical, laboratory, experimental, and other data and formulate, on their basis, a conclusion about the most likely causes and mechanisms for the development of pathological processes underlying extreme conditions, principles and methods for their detection, treatment and prevention;</li> <li>• evaluate the ECG and determine the main types of arrhythmias, signs of ischemia and myocardial infarction based on its data;</li> <li>• to analyze the leukocyte formula of neutrophils and, on this basis, formulate a conclusion about changes in it;</li> <li>• formulate a conclusion on the hemogram on the presence and type of a typical form of pathology of the blood system;</li> <li>• analyze coagulogram indicators and on this basis formulate a conclusion about changes in it;</li> <li>• determine the typical forms of impaired gas exchange function of the lungs in terms of alveolar ventilation, blood gas composition and blood flow in the lungs;</li> <li>• differentiate pathological types of breathing and explain the mechanisms of their development;</li> <li>• characterize typical disorders of kidney function according to blood tests, urine tests, clearance tests;</li> <li>• assess indicators of the acid-base state (ABS) and formulate conclusions about various types of its violations;</li> <li>• differentiate different types of hypoxia;</li> <li>• determine typical disorders of the secretory function of the stomach and intestines according to the analysis of gastric and intestinal contents;</li> <li>• interpret the results of basic diagnostic allergy tests.</li> </ul> <p><b>Master:</b></p> <ul style="list-style-type: none"> <li>• skills in analyzing the patterns of functioning of individual organs and systems in normal and pathological conditions;</li> <li>• the main methods for assessing the functional state of the human body, skills and interpretation of the results of modern diagnostic technologies;</li> <li>• skills in pathophysiological analysis of clinical syndromes, substantiate pathogenetic methods (principles) for diagnosis, treatment, rehabilitation and prevention of diseases.</li> </ul>
<p>PC-1 Willingness to participate in the provision of emergency medical care in conditions requiring urgent medical intervention</p>	<p><b>To know:</b></p> <ul style="list-style-type: none"> <li>• the role of the causes, conditions, reactivity of the organism in the occurrence, development and completion (outcome) of extreme conditions;</li> <li>• causes and mechanisms of typical pathological processes, conditions and reactions, their manifestations and significance for the organism during the development of extreme conditions;</li> </ul> <p><b>Be skilled in:</b></p>

	<ul style="list-style-type: none"> <li>• interpret the results of the most common diagnostic methods;</li> <li>• solve situational problems of various types;</li> <li>• substantiate the principles of pathogenetic therapy of underlying extreme conditions.</li> </ul> <p><b>Master:</b></p> <ul style="list-style-type: none"> <li>• skills of a systematic approach to the analysis of medical information;</li> <li>• principles of evidence-based medicine based on the search for solutions using theoretical knowledge and practical skills;</li> </ul>
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#### 4. SUBJECT VOLUME


**4.1. Subject volume in credits (total) \_\_\_\_\_ 2 \_\_\_\_\_**

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

Type of academic workload	Number of hours (form of training: full time)	
	Total in the plan	Throughout the terms
		term № 6
1	2	3
Student-Teacher activity	34/34**	34/34**
Auditory classes:	34	34
Lectures	17/3*/17**	17/3*/17**
practical classes and seminars	17/17**	17/17**
lab work (practical activity in the lab)	38	38
Concurrent checking (number and type: a test, a colloquium, a report, cases)		Interviewing students, checking the protocols of practical work; tests, cases
Types of midterm assessment (an exam, a test)		a credit
Total number of hours on the subject	72	72

\* - number of hours spent interactively


«\*\* If it is necessary to use partially / exclusively distance educational technologies in the educational process, in the table, through a slash, the number of hours of work of teaching staff with students for conducting classes in a distance format using e-learning is indicated»

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### 4.3. The content of a subject (unit.) Distribution of hours on themes and types of academic workload:

Form of training: full-time

Name of sections and topics	Total	Types of classes					Self-study work	Форма текущего контроля знаний lectures
		Classes			Inter-active classes			
		lectures	practical classes and seminars	lab work				
1	2	3	4	5	1	2	3	
<b>Section 1. Pathophysiology of extreme states.</b>								
1. Pathophysiology of stress, its role in the development of pathology.	6	1	1			4	Questions on the practical class, credit. Interview.	
2. Pathophysiology of starvation. Energy metabolism disorders	8	2	2			4	Questions on the practical class, credit. Interview.	
3. Pathophysiology of the infectious process. Septic and anaphylactic shock.	8	2	2			4	Questions on the practical class, credit. Interview.	
4. Pathophysiology of collapse, traumatic and cardiogenic shock.	8	2	2			4	Questions on the practical class, credit. Interview.	
5. Pathophysiology of metabolic coma.	8	2	2		1	4	Questions on the practical class, credit. Interview.	
6. Violations of higher nervous activity.	8	2	2		1	4	Questions on the practical class, credit. Interview.	
<b>Section 2. Pathophysiology of syndromes developing in extreme conditions</b>								
7. Pathophysiology of the pain syndrome.	8	2	2			4	Questions on the practical class, credit. Interview.	
8. Syndromes of acute and chronic renal failure.	9	2	2		1	5	Questions on the practical class, credit. Interview.	
9. Syndrome of multiple organ failure.	9	2	2			5	Questions on the practical class, credit. Interview.	
<b>Total</b>	<b>72</b>	<b>17</b>	<b>17</b>		<b>3</b>	<b>38</b>		

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### Interactive classes

№	The name of the discipline section	Forms of the interactive classes	Duration (hours)
1.	Syndromes of acute and chronic renal failure.	Discussion in a group when solving situational problems.	1
2.	Pathophysiology of metabolic coma.	Discussion in a group when solving situational problems.	1
3.	Violations of higher nervous activity.	Discussion in a group when solving situational problems.	1
TOTAL			3

## 5. COURSE CONTENT

### Section 1. Pathophysiology of extreme conditions.

#### Topic 1. Pathophysiology of stress, its role in the development of pathology.

Stress as a non-specific reaction of the body to injury. Types of stress. Causes of stress. The mechanism of development of stress. The role of neurohumoral factors in the formation of adaptive and compensatory reactions of the body to damage. Protective-adaptive and pathogenic significance of stress. Features and significance of perinatal stress.

#### Topic 2. Pathophysiology of starvation. Violations of energy metabolism.

Starvation, definition of the concept, types. Endogenous and exogenous causes of starvation. Fasting periods, changes in metabolism and physical functions during different periods of fasting. Absolute, complete, incomplete, partial starvation, their characteristics. Protein starvation, causes, mechanism of development, manifestations, consequences. Factors that determine the duration of fasting. Clinical manifestations of starvation, mechanism of development. The concept of therapeutic fasting. Factors that determine the intensity of energy metabolism in the body. Pathology of energy metabolism, causes and mechanism of development. Clinical manifestations.

#### Topic 3. Pathophysiology of the infectious process. Septic and anaphylactic shock.


Infectious process, definition of the concept. Infectious process as one of the forms of interaction between macro- and microorganisms. The etiology of the infectious process, the concept of exo- and endotoxins. Factors that determine the virulence of microorganisms.

The role of external conditions and reactivity of the organism in the occurrence, development and outcome of the infectious process. Mechanisms of anti-infective resistance of the organism.

Entrance gates of infection, ways of spreading an infectious agent in a macroorganism. Stages of the course of the infectious process, their characteristics. General patterns of development of infectious diseases (inflammation, fever, hypoxia, etc.)

Mediators of infectious-allergic reactions (the role of cytokines, lymphokines, monokines, complement components, etc.), their mechanism of action. Violation of the function of organs in the infectious process. Nonspecific and specific humoral and cellular mechanisms of anti-infective protection. Principles of therapy of the infectious process.

Septic shock, definition, etiology and mechanisms of development. Mediators of septic shock, their mechanism of action. Action of endotoxins and exotoxins on target cells. Violation of the state of

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the hemostasis system in septic shock. Principles of etiopathogenetic treatment of septic shock and emergency care.

Anaphylactic shock, definition, causes, mechanisms of development. Mediators of anaphylactic shock, their mechanism of action. Clinical variants of the course of anaphylactic shock, their characteristics. Mechanisms of formation of pathological changes in anaphylactic shock, determination of the severity of the course. Etiopathogenetic therapy and prevention of anaphylactic shock.

#### **Topic 4. Pathophysiology of collapse, traumatic and cardiogenic shock.**

Collapse, definition, classification. Fainting. Characteristics of the main types of collapse, development mechanism, clinical manifestations. Etiological and pathogenetic principles of treatment. Shock, definition, etiopathogenetic classification, mechanism of development of the main syndromes in shock. Mechanisms of damage to organs and systems in shock, the formation of "shock lungs", "shock kidneys". Traumatic shock, etiology, stages of development. The role of neuroendocrine and humoral mechanisms in the development of traumatic shock. Clinical manifestations of traumatic shock, assessment of its severity. Syndrome of prolonged crushing, causes, mechanism of development. Cardiogenic shock, etiology. Mechanism of development of cardiogenic shock. The role of a decrease in myocardial contractility, vascular insufficiency, impaired microcirculation, pain syndrome, etc. in the development of cardiogenic shock. Clinical manifestations of cardiogenic shock. Etiopathogenetic principles of treatment.

#### **Topic 5. Pathophysiology of metabolic coma.**

Coma, definition of the concept, types. Etiology of coma, main pathogenetic factors of development. Metabolic coma, definition of the concept, classification. Ketoacidotic coma, etiology, mechanism of development, clinical manifestations, pathogenetic principles of treatment. Hyperosmolar coma, causes, mechanism of development, clinical manifestations, ways of prevention and pathogenetic therapy.

Lacticidemic coma, causes, mechanism of development, clinical manifestations, pathogenetic therapy. Hypoglycemic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy. Chlorhydropenic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy.


#### **Topic 6. Disorders of higher nervous activity.**

The main mechanisms that provide the function of higher nervous activity. General characteristics, causes and mechanisms. Reasons for the development of neuroses and factors contributing to their development. Anxiety-phobic states (compulsive disorder), causes, formation of the development of the pathology of higher nervous activity. "Neurosis", definition, concept. Methods of reproduction of experimental neuroses. Classification of neuroses (classic neuroses of psychological conflict, clinical manifestations, stages of development. Types of phobias. Hysterical neurosis, factors contributing to the development, formation of psychological conflict, clinical manifestations. Neurasthenia, causes, mechanism of development, formation of psychological conflict, clinical manifestations.

### **Section 2. Pathophysiology of syndromes developing in extreme conditions**

#### **Topic 7. Pathophysiology of pain syndrome.**

Pain as an integrative response of the body to injury. The biological significance of pain as a signal of danger and damage. Nociceptive stimuli and mechanisms of their perception. Receptor, conduction and central links of the pain apparatus. The concept of "physiological" and "pathological" pain.

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Endogenous mechanisms of pain suppression. Pathophysiological basis of anesthesia. Humoral pain factors. The pathogenesis of acute and chronic pain. Visceral pain, definition of the concept, mechanism of development. Reflected pain, definition of the concept, mechanism of development. Phantom pain, definition of the concept, mechanism of development. Vegetative compensation of pain reactions.

### **Topic 8. Syndromes of acute and chronic renal failure.**

Acute renal failure, definition, concepts. Prerenal, renal and postrenal factors in the development of acute renal failure. Pathogenesis of acute renal failure, clinical manifestations, stages of development, their characteristics and mechanisms of development. The main syndromes in acute renal failure. Etiopathogenetic principles of treatment of acute renal failure. Chronic kidney disease (CKD), definition of the concept. Principles and stages of CKD development, their characteristics. Etiology and mechanism of development of CRF. The role of hyperinsulinism, secondary hyperparathyroidism, changes in blood lipid profile in the pathogenesis of chronic renal failure. The pathogenesis of uremic coma. Mechanisms of progression of chronic kidney disease. Principles of modern nephroprotective therapy.

### **Topic 4. Syndrome of multiple organ failure.**

Multiple organ failure, definition. Etiology, classification.

Phases of development of multiple organ failure. Mediators of multiple organ failure, their mechanism of action.

The role of cytokines IL-1, IL-6, TNF in the development of multiple organ failure as first-order mediators.

Formation of the systemic inflammatory response syndrome (SIRS). Clinical manifestations of SIRS, stages of development, their characteristics. The concept of primary and secondary multiple organ failure. Markers of "survival" in multiple organ failure. Prognostic signs of multiple organ failure. Assessment of the severity of the condition in multiple organ failure. The general pattern of formation and the sequence of involvement of body systems in the syndrome of multiple organ failure. Metabolic reactions to systemic damage (proteins, carbohydrates, lipids). Clinical and laboratory indicators of hypermetabolism in multiple organ failure. Violation of the function of organs and systems in the syndrome of multiple organ failure (cardiovascular, respiratory system, liver, kidneys, gastrointestinal tract, etc.). Alcoholism, etiology, formation mechanism. Drug addiction, etiology, formation mechanism. Complications of alcoholism and drug addiction.

## **6. TOPICS OF PRACTICAL CLASSES AND SEMINARS**


### **Section 1. Pathophysiology of extreme conditions.**

#### ***Topic. Pathophysiology of stress, its role in the development of pathology.***

Questions.

1. Stress as a non-specific reaction of the body to damage. Types of stress.
2. Causes and main ways of realization of the stress reaction.
3. The role of the neuroendocrine system in the development of the stress response.
4. General adaptation syndrome, stages, mechanism of development.
5. Pathogenetic features of emotional stress.
6. The main stress-limiting systems of the body, their role in modulating the stress response.



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7. Protective-adaptive and pathogenic significance of the stress reaction, implementation mechanisms.

8. The role of stress in the development of cardiovascular diseases (hypertension, coronary artery disease, myocardial infarction).

9. The role of stress in the pathogenesis of diseases of the gastrointestinal tract (peptic ulcer of the stomach and duodenum, nonspecific ulcerative colitis).

10. The role of stress in the development of secondary immunodeficiency, mental, oncological and other diseases.

Solving a cases.

Topic 2: Pathophysiology of starvation. Violations of energy metabolism.

Questions:


1. Fasting, definition of the concept, types.
2. Endogenous and exogenous causes of starvation.
3. Fasting periods, changes in metabolism and physical functions during different fasting periods.
4. Absolute, complete, incomplete, partial starvation, their characteristics.
5. Protein starvation, causes, mechanism of development, manifestations, consequences.
6. Factors determining the duration of fasting.
7. Clinical manifestations of starvation, mechanism of development.
8. The concept of therapeutic fasting.
9. Factors determining the intensity of energy metabolism in the body.
10. Pathology of energy metabolism, causes and mechanism of development. Clinical manifestations.

Solving a cases.

***Topic 3: Pathophysiology of the infectious process. Septic and anaphylactic shock.***

Questions:

1. Infectious process, definition of the concept.
2. Infectious process as one of the forms of interaction between macro- and micro-organisms.
3. The etiology of the infectious process, the concept of exo- and endotoxins.
4. Factors determining the virulence of microorganisms.
5. The role of external conditions and the reactivity of the organism in the occurrence, development and outcome of the infectious process.
6. Mechanisms of anti-infective resistance of the body.
7. Entrance gates of infection, ways of spreading an infectious agent in a macroorganism.
8. Stages of the course of the infectious process, their characteristics.
9. General patterns of development of infectious diseases (inflammation, fever, hypoxia, etc.)
10. Mediators of infectious-allergic reactions (the role of cytokines, lymphokines, monokines, complement components, etc.), their mechanism of action.
11. Violation of the function of organs during the infectious process.
12. Nonspecific and specific humoral and cellular mechanisms of anti-infective protection.
13. Principles of therapy of the infectious process.
14. Septic shock, definition, etiology and mechanisms of development.
15. Septic shock mediators, their mechanism of action.

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16. Action of endotoxins and exotoxins on target cells.
17. Violation of the state of the hemostasis system in septic shock.
18. Principles of etiopathogenetic treatment of septic shock and emergency care.
19. Anaphylactic shock, definition, causes, mechanisms of development.
20. Mediators of anaphylactic shock, their mechanism of action.
21. Clinical variants of the course of anaphylactic shock, their characteristics.
22. Mechanisms of formation of pathological changes in anaphylactic shock, determination of the severity of the course.
23. Etiopathogenetic therapy and prevention of anaphylactic shock.

Solving a cases.

#### ***Topic 4. Pathophysiology of collapse, traumatic and cardiogenic shock.***

Questions:


1. Collapse, definition, classification. Fainting.
2. Characteristics of the main types of collapse, development mechanism, clinical manifestations.
3. Etiological and pathogenetic principles of treatment.
4. Shock, definition, etiopathogenetic classification, mechanism of development of the main syndromes in shock.
5. Mechanisms of damage to organs and systems in shock, the formation of "shock lungs", "shock kidneys".
6. Traumatic shock, etiology, stages of development.
7. The role of neuroendocrine and humoral mechanisms in the development of traumatic shock.
8. Clinical manifestations of traumatic shock, assessment of its severity.
9. Syndrome of prolonged crushing, causes, mechanism of development.
10. Cardiogenic shock, etiology.
11. The mechanism of development of cardiogenic shock. The role of decreased myocardial contractility, vascular insufficiency, impaired microcirculation, pain syndrome, etc. in the development of cardiogenic shock.
12. Clinical manifestations of cardiogenic shock. Etiopathogenetic principles of treatment.

Solving a cases.

#### ***Topic 5. Pathophysiology of metabolic coma.***

Questions:

1. Coma, definition of the concept, types. Etiology of coma, main pathogenic factors of development.
2. Metabolic coma, definition of the concept, classification.
3. Ketoacidotic coma, etiology, mechanism of development, clinical manifestations, pathogenetic principles of treatment.
4. Hyperosmolar coma, causes, mechanism of development, clinical manifestations, ways of prevention and pathogenetic therapy.
5. Lacticidemic coma, causes, mechanism of development, clinical manifestations, pathogenetic therapy.
6. Hypoglycemic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy.
7. Chlorhydropenic coma, causes, mechanism of development, clinical manifestations and

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pathogenetic therapy.

Solving a cases.

***Topic 6. Disorders of higher nervous activity.***

Questions.

1. The main mechanisms that provide the function of higher nervous activity.
2. General characteristics, causes and mechanisms of development of the pathology of higher nervous activity.
3. Violation of higher nervous activity. General characteristics of the causes and mechanisms of the pathology of higher nervous activity.
4. "Neurosis", definition, concept.
5. Methods of reproduction of experimental neuroses.
6. Classification of neuroses (classical neuroses).
7. Reasons for the development of neuroses and factors contributing to their development.
8. Anxiety-phobic states (compulsive disorder), causes, formation of psychological conflict, clinical manifestations, stages of development. Types of phobias.
9. Hysterical neurosis, factors contributing to the development, the formation of a psychological conflict, clinical manifestations.
10. Neurasthenia, causes, mechanism of development, formation of psychological conflict, clinical manifestations.

Solving a cases.

**Section 2. Pathophysiology of syndromes developing in extreme conditions**

***Topic 7. Pathophysiology of pain syndrome.***

Questions.


1. Pain as an integrative reaction of the body to damage.
2. The biological significance of pain as a signal of danger and damage.
3. Nociceptive stimuli and mechanisms of their perception.
4. Receptor, conduction and central links of the pain apparatus.
5. Humoral factors of pain.
6. Pathogenesis of acute and chronic pain.
7. The concepts of "physiological" and "pathological" pain.
8. Endogenous mechanisms of pain suppression.
9. Pathophysiological basis of anesthesia.
10. Visceral pain, definition of the concept, mechanism of development.
11. Reflected pain, definition of the concept, mechanism of development.
12. Phantom pain, definition of the concept, mechanism of development.
13. Vegetative compensation of pain reactions.

Solving a case.

***Topic 8: Syndromes of acute and chronic renal failure.***

Questions:

1. Acute renal failure, definition, concepts.

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2. Prerenal, renal and postrenal factors in the development of acute renal failure.
  3. Pathogenesis of acute renal failure, clinical manifestations, stages of development, their characteristics and mechanisms of development.
  4. Main syndromes in acute renal failure.
  5. Etiopathogenetic principles for the treatment of acute renal failure.
  6. Chronic kidney disease (CKD), definition of the concept.
  7. Principles and stages of CKD development, their characteristics.
  8. Etiology and mechanism of development of CRF.
  9. The role of hyperinsulinism, secondary hyperparathyroidism, changes in the blood lipid profile in the pathogenesis of chronic renal failure.
  10. Pathogenesis of uremic coma.
  11. Mechanisms of progression of chronic kidney disease.
  12. Principles of modern nephroprotective therapy.
- Solving a case.

***Topic 4: Syndrome of multiple organ failure.***


Questions:

1. Multiple organ failure, definition.
  2. Etiology, classification.
  3. Phases of development of multiple organ failure.
  4. Mediators of multiple organ failure, their mechanism of action.
  5. The role of cytokines IL-1, IL-6, TNF in the development of multiple organ failure as first-order mediators.
  6. Formation of the systemic inflammatory response syndrome (SIRS).
  7. Clinical manifestations of SIRS, stages of development, their characteristics.
  8. The concept of primary and secondary multiple organ failure.
  9. Markers of "survival" in multiple organ failure.
  10. Prognostic signs of multiple organ failure. Assessment of the severity of the condition in multiple organ failure.
  11. General pattern of formation and sequence of involvement of body systems in the syndrome of multiple organ failure.
  12. Metabolic reactions to systemic damage (proteins, carbohydrates, lipids). Clinical and laboratory indicators of hypermetabolism in multiple organ failure.
  13. Violation of the function of organs and systems in the syndrome of multiple organ failure (cardiovascular, respiratory system, liver, kidneys, gastrointestinal tract, etc.).
- Solving a case.

***Topic 8: Syndromes of acute and chronic renal failure.***

Questions:

13. Acute renal failure, definition, concepts.
14. Prerenal, renal and postrenal factors in the development of acute renal failure.
15. Pathogenesis of acute renal failure, clinical manifestations, stages of development, their characteristics and mechanisms of development.

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16. Main syndromes in acute renal failure.
17. Etiopathogenetic principles for the treatment of acute renal failure.
18. Chronic kidney disease (CKD), definition of the concept.
19. Principles and stages of CKD development, their characteristics.
20. Etiology and mechanism of development of CRF.
21. The role of hyperinsulinism, secondary hyperparathyroidism, changes in the blood lipid profile in the pathogenesis of chronic renal failure.
22. Pathogenesis of uremic coma.
23. Mechanisms of progression of chronic kidney disease.
24. Principles of modern nephroprotective therapy.

Solving a cases.


**7. LABORATORY PRACTICE** - This type of work is not provided for by the curriculum.

**8. SUBJECT OF COURSEWORK, CONTROL WORKS, ABSTRACTS** - This type of work is not provided by the curriculum.


### 9. LIST OF QUESTIONS TO THE CREDIT

#### 9.1. Exemplary questions of credit for "Pathophysiology of extreme states".


Compe- tence index	№ as- sign- ment	Question wording
UC-1	1.	Extreme states, definition of the concept, general characteristics, types. Mechanisms of development of extreme conditions.
UC-1	2.	Stress as a non-specific reaction of the body to injury. Types of stress. Causes of stress.
UC-1	3.	The role of neurohumoral factors in the formation of adaptive and compensatory reactions of the body to damage.
UC-1	4.	Protective-adaptive and pathogenic significance of stress.
UC-1	5.	Starvation, definition of the concept, types. Endogenous and exogenous causes of starvation. Fasting periods, changes in metabolism and physical functions during different periods of fasting.
UC-1	6.	Absolute, complete, incomplete, partial starvation, their characteristics. Factors that determine the duration of fasting.
UC-1	7.	Protein starvation, causes, mechanism of development, manifestations, consequences.
UC-1	8.	Clinical manifestations of starvation, mechanism of development. The concept of therapeutic fasting.
UC-1	9.	Factors that determine the intensity of energy metabolism in the body. Pathology of energy metabolism, causes and mechanism of development. Clinical manifestations.
UC-1	10.	Infectious process, definition of the concept.
UC-1	11.	The etiology of the infectious process, the concept of exo- and endotoxins.

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UC-1	12.	Factors that determine the virulence of microorganisms. The role of external conditions and reactivity of the organism in the occurrence, development and outcome of the infectious process.
UC-1	13.	Mechanisms of anti-infective resistance of the organism. Entrance gates of infection, ways of spreading an infectious agent in a macroorganism.
UC-1	14.	Stages of the course of the infectious process, their characteristics.
UC-1	15.	General patterns of development of infectious diseases (inflammation, fever, hypoxia, etc.).
UC-1	16.	Mediators of infectious-allergic reactions (the role of cytokines, lymphokines, monokines, complement components, etc.), their mechanism of action.
UC-1	17.	Violation of the function of organs in the infectious process.
UC-1	18.	Nonspecific and specific humoral and cellular mechanisms of anti-infective protection. Principles of therapy of infectious process.
UC-1	19.	Hepatic encephalopathy, causes, clinical manifestations. The mechanism of development of hepatic encephalopathy (toxic theory, theory of false neurotransmitters, GABAergic processes in the pathogenesis of hepatic encephalopathy).
UC-1	20.	Stages of development of hepatic encephalopathy, their characteristics, clinical manifestations.
UC-1	21.	The main syndromes in the development of hepatic encephalopathy, the mechanism of development. Hepatic coma, types, mechanism of development, consequences. Pathogenetic therapy of hepatic encephalopathy.
UC-1	22.	Coma, definition of the concept, types. Etiology of coma, main pathogenetic factors of development. Metabolic coma, definition of the concept, classification.
UC-1	23.	Ketoacidotic coma, etiology, mechanism of development, clinical manifestations, pathogenetic principles of treatment. Hyperosmolar coma, causes, mechanism of development, clinical manifestations, ways of prevention and pathogenetic therapy.
UC-1	24.	Lactacidemic coma, causes, mechanism of development, clinical manifestations, pathogenetic therapy.
UC-1	25.	Hypoglycemic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy.
UC-1	26.	Chlorhydropenic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy.
UC-1	27.	Collapse, definition, classification. Fainting. Characteristics of the main types of collapse, development mechanism, clinical manifestations. Etiological and pathogenetic principles of treatment.
UC-1	28.	Shock, definition, etiopathogenetic classification, mechanism of development of the main syndromes in shock.
UC-1	29.	Mechanisms of damage to organs and systems in shock, the formation of "shock lungs", "shock kidneys".
UC-1	30.	Traumatic shock, etiology, stages of development, mechanism of development.
UC-1	31.	Syndrome of prolonged crushing, causes, mechanism of development.
UC-1	32.	Cardiogenic shock, etiology. Mechanism of development of cardiogenic shock. The role of a decrease in myocardial contractility, vascular insufficiency, impaired microcirculation, pain syndrome, etc. in the development of cardiogenic shock. Clinical manifestations of cardiogenic shock. Etiopathogenetic principles of treatment.
UC-1	33.	Septic shock, definition, etiology and mechanisms of development. Septic shock mediators, their mechanism of action. Action of endotoxins and exotoxins on target

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		cells. Violation of the state of the hemostasis system in septic shock.
UC-1	34.	Principles of etiopathogenetic treatment of septic shock and emergency care.
UC-1	35.	Anaphylactic shock, definition, causes, mechanisms of development. Mediators of anaphylactic shock, the mechanism of their action. Clinical variants of the course of anaphylactic shock, their characteristics.
UC-1	36.	Mechanisms of formation of pathological changes in anaphylactic shock, determination of the severity of the course. Etiopathogenetic therapy and prevention of anaphylactic shock.
UC-1	37.	Violation of higher nervous activity. General characteristics of the causes and mechanisms of the pathology of higher nervous activity.
UC-1	38.	Anxiety-phobic states (obsessive-compulsive disorder), causes, formation of psychological conflict, clinical manifestations, stages of development. Types of phobias.
UC-1	39.	Hysterical neurosis, factors contributing to the development, the formation of psychological conflict, clinical manifestations.
PC-1	40.	Pain as an integrative response of the body to injury. The biological significance of pain as a signal of danger and damage.
PC-1	41.	Nociceptive stimuli and mechanisms of their perception. Receptor, conduction and central links of the pain apparatus.
PC-1	42.	The pathogenesis of acute and chronic pain.
PC-1	43.	Visceral pain, definition of the concept, mechanism of development.
PC-1	44.	Pathological pain of central and peripheral origin (reflected, phantom, causalgia, thalamic pain). Definition of the concept, mechanism of development.
PC-1	45.	Multiple organ failure, definition. Etiology, classification. Phases of development of multiple organ failure.
PC-1	46.	Mediators of multiple organ failure, their mechanism of action. The role of cytokines IL-1, IL-6, TNF in the development of multiple organ failure as first-order mediators.
PC-1	47.	Formation of the systemic inflammatory response syndrome (SIRS). Clinical manifestations of SIRS, stages of development, their characteristics.
PC-1	48.	The concept of primary and secondary multiple organ failure. Markers of "survival" in multiple organ failure. Prognostic signs of multiple organ failure. Assessment of the severity of the condition in multiple organ failure.
PC-1	49.	The general pattern of formation and the sequence of involvement of body systems in the syndrome of multiple organ failure. Clinical and laboratory indicators of hypermetabolism in multiple organ failure. Violation of the function of organs and systems in the syndrome of multiple organ failure (cardiovascular, respiratory system, liver, kidneys, gastrointestinal tract, etc.).
PC-1	50.	Acute renal failure (ARF), definition, concepts. Prerenal, renal and postrenal factors in the development of acute renal failure. Pathogenesis of acute renal failure, clinical manifestations, stages of development, their characteristics and mechanisms of development.
PC-1	51.	The main syndromes in acute renal failure. Etiopathogenetic principles of treatment of acute renal failure.
PC-1	52.	Chronic kidney disease (CKD), definition of the concept. Principles and stages of CKD development, their characteristics.
PC-1	53.	Etiology and mechanism of development of CKD. The pathogenesis of uremic coma.

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PC-1	54.	Mechanisms of progression of chronic kidney disease. Principles of modern nephroprotective therapy.
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## 10. SELF-STUDY WORK OF STUDENTS

<i>Title of sections and topics</i>	<i>Type of independent work</i>	<i>Volume in hours</i>	<i>Form of control</i>
<b>Section 1. Pathophysiology of extreme conditions.</b>			
<p><b>Topic 1: Pathophysiology of stress, its role in the development of pathology.</b></p> <ol style="list-style-type: none"> <li>1. Stress as a non-specific reaction of the body to damage. Types of stress.</li> <li>2. Causes and main ways of realization of the stress reaction.</li> <li>3. The role of the neuroendocrine system in the development of the stress response.</li> <li>4. General adaptation syndrome, stages, mechanism of development.</li> <li>5. Pathogenetic features of emotional stress.</li> <li>6. The main stress-limiting systems of the body, their role in modulating the stress response.</li> <li>7. Protective-adaptive and pathogenic significance of the stress reaction, implementation mechanisms.</li> <li>8. The role of stress in the development of cardiovascular diseases (hypertension, coronary artery disease, myocardial infarction).</li> <li>9. The role of stress in the pathogenesis of diseases of the gastrointestinal tract (peptic ulcer of the stomach and duodenum, nonspecific ulcerative colitis).</li> <li>10. The role of stress in the development of secondary immunodeficiency, mental, oncological and other diseases.</li> </ol>	Study of educational material on issues of the topic, preparation for passing the credit.	4h	Interview and discussion on issues during practical class; credit.
<p><b>Topic 2: Pathophysiology of starvation. Violations of energy metabolism.</b></p> <ol style="list-style-type: none"> <li>1. Fasting, definition of the concept, types.</li> <li>2. Endogenous and exogenous causes of starvation.</li> <li>3. Fasting periods, changes in metabolism and physical functions during different fasting periods.</li> <li>4. Absolute, complete, incomplete, partial starvation, their characteristics.</li> <li>5. Protein starvation, causes, mechanism of development, manifestations, consequences.</li> <li>6. Factors that determine the duration of fasting.</li> <li>7. Clinical manifestations of starvation, mechanism of development.</li> <li>8. The concept of therapeutic fasting.</li> <li>9. Factors determining the intensity of energy metabo-</li> </ol>	Study of educational material on issues of the topic, preparation for passing the credit.	4h	Interview and discussion on issues during practical class; credit.







<p>lism in the body. 10. Pathology of energy metabolism, causes and mechanism of development. Clinical manifestations.</p>			
<p><b>Topic 3: Pathophysiology of the infectious process. Septic and anaphylactic shock.</b> 1. Septic shock, definition, etiology and mechanisms of development. 2. Mediators of septic shock, their mechanism of action. 3. Action of endotoxins and exotoxins on target cells. 4. Violation of the state of the hemostasis system in septic shock. 5. Principles of etiopathogenetic treatment of septic shock and emergency care. 6. Anaphylactic shock, definition, causes, mechanisms of development. 7. Mediators of anaphylactic shock, mechanism of their action. 8. Clinical variants of the course of anaphylactic shock, their characteristics. 9. Mechanisms of formation of pathological changes in anaphylactic shock, determination of the severity of the course. 10. Etiopathogenetic therapy and prevention of anaphylactic shock.</p>	<p>Study of educational material on issues of the topic, preparation for passing the credit.</p>	<p>4h</p>	<p>Interview and discussion on issues during practical class; credit.</p>
<p><b>Topic 4: Pathophysiology of collapse, traumatic and cardiogenic shock.</b> 1. Collapse, definition, classification. Fainting. 2. Characteristics of the main types of collapse, development mechanism, clinical manifestations. 3. Etiological and pathogenetic principles of treatment. 4. Shock, definition, etiopathogenetic classification, mechanism of development of the main syndromes in shock. 5. Mechanisms of damage to organs and systems in shock, the formation of "shock lungs", "shock kidneys". 6. Traumatic shock, etiology, stages of development. 7. The role of neuroendocrine and humoral mechanisms in the development of traumatic shock. 8. Clinical manifestations of traumatic shock, assessment of its severity. 9. Syndrome of prolonged crushing, causes, mechanism of development. 10. Cardiogenic shock, etiology. 11. The mechanism of development of cardiogenic shock. The role of decreased myocardial contractility, vascular insufficiency, impaired microcirculation, pain syndrome, etc. in the development of cardiogenic shock.</p>	<p>Study of educational material on issues of the topic, preparation for passing the credit.</p>	<p>4h</p>	<p>Interview and discussion on issues during practical class; credit.</p>




<p>12. Clinical manifestations of cardiogenic shock. Etiopathogenetic principles of treatment.</p>			
<p><b>Topic 5: Pathophysiology of metabolic coma.</b> 1. Coma, definition of the concept, types. Etiology of coma, main pathogenetic factors of development. 2. Metabolic coma, definition of the concept, classification. 3. Ketoacidotic coma, etiology, mechanism of development, clinical manifestations, pathogenetic principles of treatment. 4. Hyperosmolar coma, causes, mechanism of development, clinical manifestations, ways of prevention and pathogenetic therapy. 5. Lactacidemic coma, causes, mechanism of development, clinical manifestations, pathogenetic therapy. 6. Hypoglycemic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy. 7. Chlorhydropenic coma, causes, mechanism of development, clinical manifestations and pathogenetic therapy.</p>	<p>Study of educational material on issues of the topic, preparation for passing the credit.</p>	<p>4h</p>	<p>Interview and discussion on issues during practical class; credit.</p>
<p><b>Topic 6: Disorders of higher nervous activity.</b> 1. The main mechanisms that provide the function of higher nervous activity. 2. General characteristics, causes and mechanisms of development of the pathology of higher nervous activity. 3. Violation of higher nervous activity. General characteristics of the causes and mechanisms of the pathology of higher nervous activity. 4. "Neurosis", definition, concept. 5. Methods of reproduction of experimental neuroses. 6. Classification of neuroses (classical neuroses). 7. Reasons for the development of neuroses and factors contributing to their development. 8. Anxious-phobic states (neurosis of obsessive states), causes, formation of a psychological conflict, clinical manifestations, stages of development. Types of phobias. 9. Hysterical neurosis, factors contributing to the development, the formation of a psychological conflict,</p>	<p>Study of educational material on issues of the topic, preparation for passing the credit.</p>	<p>4h</p>	<p>Interview and discussion on issues during practical class; credit.</p>

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clinical manifestations. 10. Neurasthenia, causes, mechanism of development, formation of psychological conflict, clinical manifestations.			
<b>Section 2. Pathophysiology of syndromes developing in extreme conditions</b>			
<p><b>Тема 7: Патофизиология болевого синдрома.</b></p> <ol style="list-style-type: none"> <li>1. Боль как интегративная реакция организма на повреждение.</li> <li>2. Биологическое значение боли как сигнала опасности и повреждения.</li> <li>3. Ноцицептивные раздражители и механизмы их восприятия.</li> <li>4. Рецепторный, проводниковый и центральный звенья аппарата боли.</li> <li>5. Гуморальные факторы боли.</li> <li>6. Патогенез острой и хронической боли.</li> <li>7. Понятия о «физиологической» и «патологической» боли.</li> <li>8. Эндогенные механизмы подавления боли.</li> <li>9. Патофизиологические основы обезболивания.</li> <li>10. Висцеральная боль, определение понятия, механизм развития.</li> <li>11. Отраженная боль, определение понятия, механизм развития.</li> <li>12. Фантомная боль, определение понятия, механизм развития.</li> <li>13. Вегетативная компенсация болевых реакций.</li> </ol>	Study of educational material on issues of the topic, preparation for passing the credit.	4h	Interview and discussion on issues during practical class; credit.
<p><b>Тема 8: Острая и хроническая почечная недостаточность.</b></p> <ol style="list-style-type: none"> <li>1. Острая почечная недостаточность, определение, понятия.</li> <li>2. Преренальные, ренальные и постренальные факторы развития ОПН.</li> <li>3. Патогенез ОПН, клинические проявления, стадии развития, их характеристики и механизмы развития.</li> <li>4. Основные синдромы при ОПН.</li> <li>5. Этиопатогенетические принципы лечения ОПН.</li> <li>6. Хроническая болезнь почек (ХБП), определение понятия.</li> <li>7. Принципы и стадии развития ХБП, их характеристика.</li> <li>8. Этиология и механизм развития ХПН.</li> <li>9. Роль гиперинсулинизма, вторичного гиперпаратиреоза, изменения липидного профиля крови в патогенезе ХПН.</li> </ol>	Study of educational material on issues of the topic, preparation for passing the credit.	5h	Interview and discussion on issues during practical class; credit.

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<p>10. Патогенез уремической комы. 11. Механизмы прогрессирования хронических заболеваний почек. 12. Принципы современной нефропротективной терапии.</p>			
<p><b>Topic 9: Pathophysiology of multiple organ failure.</b> 1. Multiple organ failure, definition of multiple organ failure. 2. Etiology, classification. 3. Phases of development of multiple organ failure. 4. Mediators of multiple organ failure, their mechanism of action. 5. The role of cytokines IL-1, IL-6, TNF in the development of multiple organ failure as first-order mediators. 6. Formation of the systemic inflammatory response syndrome (SIRS). 7. Clinical manifestations of SIRS, stages of development, their characteristics. 8. The concept of primary and secondary multiple organ failure. 9. Markers of "survival" in multiple organ failure. 10. Prognostic signs of multiple organ failure. Assessment of the severity of the condition in multiple organ failure. 11. The general pattern of formation and the sequence of involvement of body systems in the syndrome of multiple organ failure. 12. Metabolic reactions to systemic damage (proteins, carbohydrates, lipids). Clinical and laboratory indicators of hypermetabolism in multiple organ failure. 1. 13. Violation of the function of organs and systems in the syndrome of multiple organ failure (cardiovascular, respiratory system, liver, kidneys, gastrointestinal tract, etc.).</p>	<p>Study of educational material on issues of the topic, preparation for passing the credit.</p>	<p>5h</p>	<p>Interview and discussion on issues during practical class; credit.</p>

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## 11. INSTRUCTIONAL AND INFORMATION SUPPORT OF THE SUBJECT "PATHOPHYSIOLOGY OF EXTREM STATES"

### a) The list of recommended literature

#### Essential literature:

1. Литвицкий, П. Ф. Clinical pathophysiology :concise lectures, tests, cases = Клиническая патофизиология : курс лекций, тесты, задачи : учебное пособие для студентов учреждений высшего образования / П. Ф. Литвицкий, С. В. Пирожков, Е. Б. Тезиков. - 3-е изд. ,перераб. и доп. - Москва : ГЭОТАР-Медиа, 2021. - 432 с. - 432 с. - ISBN 978-5-9704-6100-6. - Текст :электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970461006.html>
2. Литвицкий П.Ф., Патофизиология Pathophysiology :лекции, тесты, задачи : учеб. пособие для студентов учреждений высш. проф. образования / Литвицкий П. Ф., Пирожков С. В., Тезиков Е. Б. - М. : ГЭОТАР-Медиа, 2016. - 432 с. - ISBN 978-5-9704-3600-4 - Текст :электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970436004.html>
3. 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. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970459720.html>

#### Additional literature:

1. Беляева Л. Е. Clinical pathophysiology: the essentials = Клиническая патофизиология: основы / Л. Е. Беляева. - Витебск :ВГМУ, 2018. - 355 с. - ISBN 9789854669328. - Текст :электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/clinical-pathophysiology-the-essentials-12097635/>
2. Practice guide on general pathophysiology for students of medical department : Learning guide / М. В. Осиков, А. А. Агеева, К. С. Савчук, Л. В. Воргова. - Челябинск :ЮУГМУ, 2021. - 96 с. - Текст :электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/practice-guide-on-general-pathophysiology-for-students-of-medical-department-13465231/>
3. Рогова Л. Н. Manual for pathophysiology practicals / Л. Н. Рогова. - Волгоград :ВолгГМУ, 2019. - 144 с. - Текст :электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/manual-for-pathophysiology-practicals-9757146/>

#### Educational-methodical literature:

1. Methodological instructions on organization independent work students by discipline «Pathophysiology of extreme conditions» on specialty 31.05.01 «General medicine» / D. A. Kseiko, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk :UISU, 2022. - 30 p. - Неопубликованный ресурс; Наангл. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11557> . - Режим доступа: ЭБСУлГУ. - Текст :электронный.
2. Methodological instructions for practical exercises of students in the discipline «Pathophysiology of extreme conditions» for specialty 31.05.01 «General medicine» / D. A. Kseiko, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk :UISU, 2022. - 22 p. – Неопубликованный ресурс; На англ. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11556> . - Режим доступа: ЭБСУлГУ. - Текст :электронный.


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*Профессиональные базы данных, информационно-справочные системы*

**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. 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.

1.4. 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.

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

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

1.7. 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.

1.8. 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 «Консультант Плюс» - 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>

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[1a2ff8c55aa76d8229047223a7d6dc9c&custid=s6895741](http://1a2ff8c55aa76d8229047223a7d6dc9c&custid=s6895741). – Режим доступа : для авториз. пользователей. – Изображение : электронные.

**6. Федеральные информационно-образовательные порталы:**

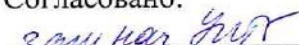
6.1. Единое окно доступа к образовательным ресурсам : федеральный портал . – URL: <http://window.edu.ru/> . – Текст : электронный.

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.

Согласовано:

  
Должность сотрудника УИТИТ

  
ФИО

 19.04.22  
подпись дата

Ministry of science and high education of the RF Ulyanovsk State University	Form	
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## 12. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE:

The auditoriums for practical training, for monitoring and intermediate certification are equipped with specialized furniture, a blackboard, and there are also

- tables by the number of sections in the total number - 173 pcs.
- slides - 102 pcs.
- devices used for practical (laboratory) studies:
  1. Photoelectric colorimeter KFK-2MP - 1 piece.
  2. Electrocardiographs EK-1-TS-3M - 2 pcs.
  3. Microscopes - BIOLAM - 15 pcs.
  4. OI-19 illuminators - 10 pcs.
  5. Laboratory centrifuge OS-6M - 1 pc.
  6. Thermostat - 1 pc.
  7. Goryaev's camera - 5 pcs.
  8. Laboratory counters - 8 pcs.
  9. Phonendoscope - 2 pcs.

Classrooms (2), equipped with table lighting (1), (building of the medical faculty, st.Arkh.Livchak 2)



The lecture halls are equipped with specialized furniture, a chalkboard, and there are also multimedia equipment for working with a large audience.

## 13. SPECIAL CONDITIONS FOR STUDENTS WITH DISABILITIES


If necessary, students from among persons with disabilities (at the request of the student) may be offered one of the following options for perception of information, taking into account their individual psychophysical characteristics:

- for persons with visual impairments: in printed form in an enlarged font; 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 tiflosurd interpreter; individual assignments and consultations;
- for persons with hearing impairments: in printed form; in the form of an electronic document; videos with subtitles; individual consultations with the involvement of a sign language interpreter; individual assignments and consultations;
- for persons with disabilities of the musculoskeletal system: in printed form; in the form of an electronic document; in the form of an audio file; individual assignments and consultations.

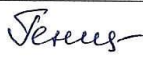
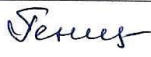
If it is necessary to use partially / exclusively distance educational technologies in the educational process, the organization of work of teaching staff with students with disabilities and disabled people is provided in the electronic information and educational environment, taking into account their individual psychophysical characteristics.


Developer _____	 Signature	Professor position	Antoneeva I.I. name
Developer _____	 Signature	Associate Professor position	Kseiko D.A. name



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**LIST OF CHANGES of**  
**Educational plan of discipline "Pathophysiology of extreme states"**  
**Speciality 31.05.01. «General medicine»**

<b>№</b>	<b>Content of the change or a link to the attached text of the</b>	<b>Full name of the head of the Department developing the discipline</b>	<b>Signature</b>	<b>Date</b>
1	Introduction of changes to item C) Professional databases, information and reference systems item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 1	Tatyana P. Gening		27.06.2023
2	Introduction of changes to item A) Recommended Literature item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 2	Tatyana P. Gening		27.06.2023

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## Appendix 1

### в) Профессиональные базы данных, информационно-справочные системы

#### 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. 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

**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.

*Начальник ОАДД Тимкова Н.А. Prof - 15.05.2023г.*

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## Appendix 2

### 11. INSTRUCTIONAL AND INFORMATION SUPPORT OF THE SUBJECT "PATHOPHYSIOLOGY OF EXTREME CONDITIONS"


#### a) The list of recommended literature

##### Essential literature:

1. Литвицкий, П. Ф. Clinical pathophysiology :concise lectures, tests, cases = Клиническая патофизиология : курс лекций, тесты, задачи : учебное пособие для студентов учреждений высшего образования / П. Ф. Литвицкий, С. В. Пирожков, Е. Б. Тезиков. - 3-е изд., перераб. и доп. - Москва : ГЭОТАР-Медиа, 2021. - 432 с. - ISBN 978-5-9704-6100-6. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970461006.html>
2. Литвицкий П.Ф., Патофизиология Pathophysiology : лекции, тесты, задачи : учеб. пособие для студентов учреждений высш. проф. образования / Литвицкий П. Ф., Пирожков С. В., Тезиков Е. Б. - М. : ГЭОТАР-Медиа, 2016. - 432 с. - ISBN 978-5-9704-3600-4 - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970436004.html>
3. 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. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970459720.html>

##### Additional literature:

1. Practice guide on general pathophysiology for students of medical department : Learning guide / М. В. Осиков, А. А. Агеева, К. С. Савчук, Л. В. Воргова. - Челябинск : ЮУГМУ, 2021. - 96 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/practice-guide-on-general-pathophysiology-for-students-of-medical-department-13465231/>
2. Рогова Л. Н. Manual for pathophysiology practicals / Л. Н. Рогова. - Волгоград : ВолгГМУ, 2019. - 144 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/manual-for-pathophysiology-practicals-9757146/>
3. Khaitov, R. M. Immunology : textbook / Rakhim M. Khaitov. - 2nd updated edition. - Moscow : GEOTAR-Media, 2021. - 272 с. - ISBN 978-5-9704-5861-7. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970458617.html>
4. Kseiko D. A. Pathophysiology of Inflammation: study guide for the 3rd year students of the medical faculty specialty 31.05.01 General medicine / D. A. Kseiko, T. V. Abakumova, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk : Ulsu, 2022. - 56 p. - Наангл. яз.; Загл. сэкрана. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/14075>. - Режим доступа: ЭБСУлГУ. - Текст : электронный.
5. Kolesnikov, L. L. Textbook of Human Anatomy. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. - Москва : GEOTAR-Media, 2020. - 288 p. - ISBN 978-5-9704-5763-4. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970457634.html>
6. L., L. Kolesnikov Textbook of Human Anatomy. In 3 vol. Vol. 2. Splanchnology and cardiovascular system / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. - Москва : GEOTAR-Media, 2020. - 320 p. - ISBN 978-5-9704-5764-1. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970457641.html>

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**Educational-methodical literature:**

1. Methodological instructions on organization independent work students by discipline «Pathophysiology of extreme conditions» on specialty 31.05.01 «General medicine» / D. A. Kseiko, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk :UISU, 2022. - 30 p. – Неопубликованный ресурс; На англ. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11557> . - Режим доступа: ЭБС УлГУ. - Текст :электронный.
2. Methodological instructions for practical exercises of students in the discipline «Pathophysiology of extreme conditions» for specialty 31.05.01 «General medicine» / D. A. Kseiko, S. O. Gening; Ulyanovsk State University, Faculty of Medicine. - Ulyanovsk :UISU, 2022. - 22 p. – Неопубликованный ресурс; Наангл. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11556> . - Режим доступа: ЭБС УлГУ. - Текст :электронный.

Agreed

Chief librarian

The position of the employee of the scientific library


/Stadolnikova Dina Rudolfovna/

full name

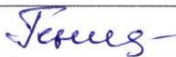
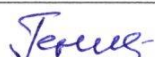
Signature


Date

*Stad* 10.05. 2023

Ministry of science and high education of the RF Ulyanovsk State University	Form	
Educational plan of the discipline		

**LIST OF CHANGES of**  
**Educational plan of discipline "Pathophysiology of extreme states"**  
**Speciality 31.05.01. «General medicine»**

<b>№</b>	<b>Content of the change or a link to the attached text of the</b>	<b>Full name of the head of the Department developing the discipline</b>	<b>Signature</b>	<b>Date</b>
1	Introduction of changes to item C) Professional databases, information and reference systems item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 3	Tatyana P. Gening		16.05.2024
2	Introduction of changes to item A) Recommended Literature item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 4	Tatyana P. Gening		16.05.2024

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Educational plan of the discipline		

### Appendix 3

#### *Профессиональные базы данных, информационно-справочные системы*

##### **1. Электронно-библиотечные системы:**

1.1. Цифровой образовательный ресурс IPRsmart : электронно-библиотечная система : сайт / ООО Компания «Ай Пи Ар Медиа». - Саратов, [2024]. – 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, [2024]. - 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, [2024]. – 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, [2024]. – URL: <https://www.rosmedlib.ru>. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО «Букап». – Томск, [2024]. – 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, [2024]. – URL: <https://e.lanbook.com>. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. ЭБС Znanium.com : электронно-библиотечная система : сайт / ООО «Знаниум». - Москва, [2024]. - 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, [2024].

**3. eLIBRARY.RU**: научная электронная библиотека : сайт / ООО «Научная Электронная Библиотека». – Москва, [2024]. – URL: <http://elibrary.ru>. – Режим доступа : для авториз. пользователей. – Текст : электронный

**4. Федеральная государственная информационная система «Национальная электронная библиотека»** : электронная библиотека : сайт / ФГБУ РГБ. – Москва, [2024]. – 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.

Инженер ведущий



Щуренко Ю.В.

2024

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#### Appendix 4

### INSTRUCTIONAL AND INFORMATION SUPPORT OF THE SUBJECT "PATHOPHYSIOLOGY OF EXTREME STATES"


#### a) The list of recommended literature

##### Essential literature:

1. Литвицкий, П. Ф. Clinical pathophysiology : concise lectures, tests, cases = Клиническая патофизиология : курс лекций, тесты, задачи : учебное пособие для студентов учреждений высшего образования / П. Ф. Литвицкий, С. В. Пирожков, Е. Б. Тезиков. - 3-е изд., перераб. и доп. - Москва : ГЭОТАР-Медиа, 2021. - 432 с. - ISBN 978-5-9704-6100-6. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970461006.html>
2. Литвицкий П.Ф., Патофизиология Pathophysiology : лекции, тесты, задачи : учеб. пособие для студентов учреждений высш. проф. образования / Литвицкий П. Ф., Пирожков С. В., Тезиков Е. Б. - М. : ГЭОТАР-Медиа, 2016. - 432 с. - ISBN 978-5-9704-3600-4 - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970436004.html>
3. 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. - ISBN 978-5-9704-5972-0. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970459720.html>

##### Additional literature:

1. Practice guide on general pathophysiology for students of medical department : Learning guide / М. В. Осиков, А. А. Агеева, К. С. Савчук, Л. В. Воргова. - Челябинск : ЮУГМУ, 2021. - 96 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/practice-guide-on-general-pathophysiology-for-students-of-medical-department-13465231/>
2. Рогова Л. Н. Manual for pathophysiology practicals / Л. Н. Рогова. - Волгоград : ВолГМУ, 2019. - 144 с. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/manual-for-pathophysiology-practicals-9757146/>
3. Khaitov, R. M. Immunology : textbook / Rakhim M. Khaitov. - 2nd updated edition. - Moscow : GEOTAR-Media, 2021. - 272 с. - ISBN 978-5-9704-5861-7. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970458617.html>
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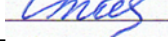
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