

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

APPROVED BY
by the decision of the Academic Council of the ULSU
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	Immunology
Faculty	Medical faculty of T.Z. Biktimirov
Name of department	Department of General and Clinical Pharmacology with Microbiology course
Course	2

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 01. 09. 2022

Revised at the Department meeting, Record No. 11 of May « 26 » 20 23

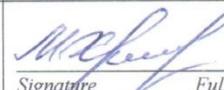
Revised at the Department meeting, Record No. of « » 20

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
Artamonova Marina Nikolaevna	Department of General and Clinical Pharmacology with Microbiology course	Associate professor, PhD in Biological Sciences
Potaturkina Nesterova Natalia Iosifovna	Department of General and Clinical Pharmacology with Microbiology course	Professor, Doctor of Medical Sciences, professor

Agreed	Agreed
Head of department, developing discipline	Head of the graduating Department
 Signature / M.P. Markevich / Full name	 Signature / Vize-Khripunova M.A. / Full name
«19» April 2022	« 19 » April 2022

**LIST OF CHANGES of
Educational plan of discipline ” IMMUNOLOGY”
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 C) Professional databases, information and reference systems item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 1	Markevich M.P.		26.05.2023
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	Markevich M.P.		26.05.2023

11. INSTRUCTIONAL AND INFORMATION SUPPORT OF THE DISCIPLINE "IMMUNOLOGY"

a) the list of recommended literature

general

1) 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>

2) Artamonova, M. N. Medical Microbiology, Virology and Immunology. Lecture Notes : textbook / Artamonova M. N., Potaturkina-Nesterova N. I., Ilyina N. A., Nemova I. S. - Москва : ГЭОТАР-Медиа, 2021. - 352 с. - ISBN 978-5-9704-6043-6. - Текст: электронный // ЭБС "Консультант студента" : [сайт]. -

URL : <https://www.studentlibrary.ru/book/ISBN9785970460436.html>

Additional

1) Artamonova M. N. Immunology : guidelines for practical classes for foreign students / M. N. Artamonova, N. I. Potaturkina-Nesterova, I.S. Nemova; Ulyanovsk State University, The Institute of Medicine, Ecology and Physical Culture. - Ulyanovsk : ULSU, 2017. - На англ. яз.; Загл. с экрана. - Электрон. текстовые дан. (1 файл : 1,70 МБ). - Текст : электронный. <http://lib.ulsu.ru/MegaPro/Download/MObject/911>

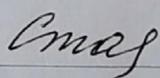
2) Островцова С. А. General Microbiology and Immunology. Summaries of the lectures = Общая микробиология и иммунология. Краткий курс лекций: пособие для студентов учреждений высшего образования, обучающихся на английском языке по специальности «Лечебное дело» : training appliance for Medical Faculty for International Students (English medium) / С. А. Островцова, А. И. Жмакин. - 2-е изд.. - Гродно : ГрГМУ, 2019. - 264 с. - ISBN 9789855951774. - Текст : электронный // ЭБС "Букап" : [сайт]. - URL : <https://www.books-up.ru/ru/book/general-microbiology-and-immunology-summaries-of-the-lectures-12050876/>

educational methodological

1) Artamonova M. N.

Guidelines for students' self-guided work for the discipline «Immunology» for specialty 31.05.01 «General medicine» / M. N. Artamonova, N. I. Potaturkina-Nesterova; Ulyanovsk State University. - Ulyanovsk : ULSU, 2022. - 24 p. - Неопубликованный ресурс; На англ. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11551>. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

AGREED:

The main librarian / Stadolnikova D.R. /  / 10.04.2023
The position of the employee of scientific library Full name signature date

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

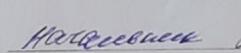
3.2. Электронная библиотека «Издательского дома «Гребенников» (Grebinnikon) : электронная библиотека / ООО ИД «Гребенников». – Москва, [2023]. – URL: <https://id2.action-media.ru/Personal/Products>. – Режим доступа : для авториз. пользователей. – Текст : электронный.

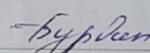
4. Федеральная государственная информационная система «Национальная электронная библиотека»: электронная библиотека: сайт / ФГБУ РГБ. – Москва, [2023]. – URL: <https://нэб.рф>. – Режим доступа: для пользователей научной библиотеки. – Текст : электронный.

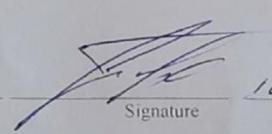
5. Российское образование: федеральный портал / учредитель ФГАУ «ФИЦТО». – URL: <http://www.edu.ru>. – Текст : электронный.

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

Agreed:


The position of the employee


Full name


Signature

10.04.2023.
Date

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F-Educational plan of the discipline		

1. OBJECTIVES AND AIM OF IMMUNOLOGY

The aim of the discipline: the formation of a scientific understanding in future doctor of the role of innate and acquired immunity in normal human activity and in diseases, mastering the most important methods of immunodiagnostics of diseases, which will prepare the student for further study of the complex of biomedical, preventive and clinical training disciplines in the specialty 31.05.01 “General Medicine”.

Objectives of the discipline:

- learning of the structure of the system, the function of the human immune system and its role in preserving the structural and functional integrity of the organism, maintaining its homeostasis and biological individuality;
- acquisition by students of knowledge in the field of immunodeficiency conditions, allergic and autoimmune diseases with immune inflammation syndrome;
- teaching of students the basic methods of assessment of the immune status of a person, interpreting the results of studies of the immune system state, forming methodological bases for setting an immunological and allergic diagnosis;
- formation of the ability and readiness to carry out advisory, informational and educational activities, to explain immunologically the choice of medical immunobiological and immunotropic drugs for diagnosis, treatment and prevention of diseases;
- forming the skills of studying scientific literature.

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

The discipline “Microbiology, virology” is referred to part formed by participants of educational relationships.(B1.B.O1) of GEP of specialty 31.05.01 «General medicine». The total complexity is 3 SET (108 academic hours). Discipline is mastered in English.

The discipline B1.O.55 "Immunology" refers to the part of the basic educational program of higher education of specialty 31.05.01 - "General Medicine".

Immunology is the preceding discipline for study of such disciplines as Hygiene, Faculty Therapy, Outpatient therapy, Public health and Healthcare, Pedagogy and Psychology of doctor’s action, Medical rehabilitation, Nanotechnologies in Medicine, Epidemiology, Basics of the rational nutrition, Marketing in the HealthCare, Organization of drug supply of people, Modern medical informational systems, Management in quantity of medical care.

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

The study of the subject «Immunology» 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
<p>PC-5 Ability and readiness to implement a set of measures aimed at maintaining and strengthening health and including the formation of a healthy lifestyle, prevention of the onset and (or) spread of diseases, their early diagnosis, identification of the causes and conditions of their occurrence and development, as well as aimed at eliminating harmful effects on human health of environmental factors</p>	<p>To know: medical and social factors affecting the health of the population</p> <p>To be able to: apply the methodology for determining the influence of medical and social factors on the health of the population and its individual groups</p> <p>To be skilled in: the main methods of sanitary educational and hygienic education of the population</p>
<p>PC-6 Ability to apply the basic principles of organization and management in the field of public health protection, in medical organizations and their structural units</p>	<p>To know: legislation in health and regulatory legal acts, as well as other documents, defining the activities of medical organizations and medical professionals</p> <p>To be able to: navigate existing regulatory legal acts; protect civil rights of doctors and patients different ages; fill in correctly medical documentation; right understand the essence of control on the implementation of official duties as a nurse precinct and other located in disposal of medical workers</p> <p>To be skilled in: moral and ethical skills argumentation; skills in conducting medical supervision for the implementation job responsibilities of medical sister of the precinct and other available medical professionals</p>

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4. Volume of the subject

Volume of the subject in credit points (total): 3 credit points

On types of academic workload (in hours): 108

Type of academic work	Number of hours (form of education : full-training)		
	Total according to the plan	Including on semesters	
		№ semester 3	№ semester 4
1	2	3	4
Work of students with a teacher	72	36	36
Classes:			
lectures	18	18	-
practical classes	54	18	36
Self-study work	36	18	18
Concurrent control (number and type: a test, a colloquium, a report)			
Types of intermediate attestation (examination, test)			offset
Total number of hours on the subject	108		

Contents of the discipline (module). Distribution of hours on themes and kinds of study: Amount of hours –108 hrs

The form of training: full time

Name of sections and topics	Total	Types of classes				
		Classes		Interactive classes	Self-study work	form of current knowledge control
		lectures	practical classes			
1	2	3	4	6	7	8
Section 1. General Immunology						
Immunology as a science. Immunity, its classification. Structure of the immune system.	14	2	2		2	oral survey, test
Organs and cells of the immune system.			2	1	2	oral survey, test
Mechanism of interaction of immune cells in immune response. Types of immune response. Theories of immune			2		2	oral survey, test

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response.						
Innate immunity. Factors of the innate immunity. Mechanical, chemical and physiological barriers.	14	2	2		2	oral survey, test
Humoral mechanisms of the innate immunity			2	1	2	oral survey, test
Cellular mechanisms of the innate immunity			2	1	2	oral survey, test
Antigens: definition, classification.	14	2	2		2	oral survey, test
Antibodies: definition, classes of immunoglobulins.			2	1	2	oral survey, test
Immunological memory. Immunological tolerance. Colloquium.			2		2	oral survey, test
Section 2. Allergology						
Topic 4. Hypersensitivity.	8	2	4	1	2	oral survey, test
Section 3. Clinical Immunology						
Pathologies of the immune system. Immunodeficiencies.	14	2	4	1	2	oral survey, test
Autoimmune diseases.			4		2	oral survey, test
Topic 6. Evaluation of the immune status	8	2	4		2	oral survey, test
Serological tests: definition, classification. Simple and complex serological tests.	14	2	4		2	oral survey, test
Serological tests using labeled			4		2	oral survey, test

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antibodies and antigens (ELISA, IFT, RIA)						
Section 4. Immunotherapy.						
Topic 8. Specific prevention and treatment of infectious diseases. Immunization. Immunotherapy.	8	2	4		2	oral survey, test
Section 5. Special Immunology						
Anti-infectious immunity: antibacterial, antiviral, antifungal antiparasitic immunities.	14	2	4		2	oral survey, test
Non-infectious immunity: transplantation immunity, immunity in pregnancy, tumor immunity.			4		2	oral survey, test
Total	108	18	54	-	36	

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.

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Interactive forms of classes

№	Name of the subject section	Interactive form of classes	Hours
1	Section 1. General Immunology. Organs and cells of the immune system.	Watching of the film and its discussion: "Our immune system"	1
2	Humoral mechanisms of the innate immunity	Watching of the film "Complement activation" and its discussion	1
3	Cellular mechanisms of the innate immunity	Watching of the film "Phagocytosis" and its discussion	1
4	Antibodies: definition, classes of immunoglobulins.	Watching of the film "Immunoglobulin classes" and its discussion	1
5	Section 2. Allergology. Hypersensitivity.	Watching of the film "Allergy" and its discussion	1
6	Pathologies of the immune system. Immunodeficiencies.	Watching of the film "David Vetter is the Bubble Boy (SCID)" and its discussion	1
	Total		6

5.

COURSE CONTENT

Section 1. General Immunology

Topic 1. Immunology as a science. Immunity, its classification. Structure of the immune system.

Immunology, its definition, problems. The history of immunology, the main periods in the development of immunology. The concept of immunity. Classification of immunity. Sections of modern immunology. Structure of the immune system.

Topic 2. Organs and cells of the immune system.

Primary organs of the immune system. Secondary organs of the immune system. The role of blood cells in immunity. Immunocompetent cells: definition, classification. The main cell populations of the immune system.

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Topic 3. Mechanism of interaction of immune cells in immune response. Types of immune response. Theories of immune response.

The forms of immune response. The mechanism of interaction of immune cells. Theories of immune response. Side-chain theory. Template theories. Selection theories. Jerne's Network Hypothesis.

Topic 4. Innate immunity. Factors of the innate immunity. Mechanical, chemical and physiological barriers.

The concept of a non-specific (innate) immunity. The main barriers of nonspecific immunity. The innate immune factors - the skin, mucous membranes. Normal microflora, its role in human immunity.

Topic 5. Humoral mechanisms of the innate immunity.

Lysozyme - chemical composition, function. Complement - chemical composition and functions. The activation of the complement. Cytokines - classification, properties. The clinical significance of cytokine detection. Interferon - chemical composition, properties. Classification. Interleukins. Protective serum proteins - acute phase reactants, C-reactive protein (CRP), β -lysozyme, mannose proteins, properdin, fibronectin.

Topic 6. Cellular mechanisms of the innate immunity

Phagocytosis, mononuclear phagocyte system. Functions of phagocytes. Opsonins. Phagocytosis mechanism, its stages. "Oxygen burst." Complete and incomplete phagocytosis. Indicators of activity of phagocytes - phagocytic index, opsonic index.

Topic 7. Antigens: definition, classification.

Antigens: definition, chemical composition. The structure of the antigen. Properties of antigens: heterogeneity, immunogenicity. Types of antigens according to the degree of foreignness. Specificity antigens, types antigenic specificity. Classification antigens on its origin, chemical structure, the degree of immunogenicity. Classification of antigens by the immune response. Haptens. Adjuvants. The antigens of the human body. Major histocompatibility complex. MHC class I. MHC class II. The antigens of bacteria, viruses, tumor antigens. Ways of penetration of antigens into the human body.

Topic 8. Antibodies: definition, classes of immunoglobulins.

Antibodies: definition, structure. The structure of the immunoglobulin. Immunoglobulin classes. Serum immunoglobulins. The properties of antibodies. Phases of antibody synthesis. Functions of antibodies.

Topic 9. Immunological memory. Immunological tolerance. Colloquium.

Immunological memory: definition, mechanisms. Advantages and disadvantages of

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immunological memory. Immunological memory: definition, classification. Mechanisms of immunological memory. The using of immunological memory in medicine.

Section 2. Allergology

Topic 10. Hypersensitivity.

Hypersensitivity, its definition. The definition of allergy, stages of allergic reaction. Classification of allergies. I type reactions of immediate type hypersensitivity: anaphylaxis (mechanism of development, manifestations of anaphylaxis, principles of therapy). Anaphylactic shock. Atopy. II type of immediate hypersensitivity: cytotoxic: mechanisms of development, clinical manifestations. III type of immediate hypersensitivity reactions: immune complex: mechanisms of development, clinical manifestations. Delayed type of hypersensitivity: mechanism of development, manifestations of contact allergy. Classification of allergens. Infectious allergy. Drug allergies: the immune response to the drug-haptens, clinical manifestations of drug allergy. The principles of treatment and prevention of drug allergy. Laboratory diagnosis of allergies.

Section 3. Clinical Immunology

Topic 11. Pathologies of the immune system. Immunodeficiencies

The definition of immunodeficiency, the classification of immunodeficiencies. Causes of congenital immunodeficiencies. Primary immunodeficiencies: characteristics, classification. Combined immunodeficiencies. Secondary (acquired) immunodeficiency: characteristics, classification. The causes of acquired immune deficiencies. Clinical manifestations of immunodeficiency states. Factors affecting the immune status.

Topic 12. Autoimmune diseases.

Autoimmunity, its mechanism. Autoimmune diseases: definition, classification. Cytotoxic autoimmune reactions: Graves' disease. Immune complex autoimmune reactions: Systemic lupus erythematosus, rheumatoid arthritis. Cell-Mediated autoimmune reactions: Multiple sclerosis, Insulin-dependent diabetes mellitus.

Topic 13. Evaluation of the immune status.

Laboratory diagnosis of immunodeficiencies in children and adults: methods, assessment criteria, interpretation. Methods of assessment of the immune status. Levels of assessment of immune status. General rules of immunogram evaluation.

Topic 14. Serological tests: definition, classification. Simple and complex serological tests.

The main principles and aims of the serological tests in medical practice. Agglutination test: definition, mechanism and practical using. Classification of agglutination tests. Precipitation test: identification, mechanism, types, practical using. Agglutination and precipitation sera: preparation, titration, practical use. Complement fixation test (CFT):

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components, mechanisms.

Topic 15. Serological tests using labeled antibodies and antigens (ELISA, IFT, RIA)

Immunofluorescent test (IFT): components, mechanism. Direct and indirect IFT. Enzyme linked immunosorbent assay (ELISA): components, mechanism. Direct and indirect ELISA. Radioimmunoassay (RIA): components, mechanism.

Section 4. Immunotherapy

Topic 16. Specific prevention and treatment of infectious diseases. Immunization. Immunotherapy.

Immunoprophylaxis, immunotherapy: definitions. Immunobiological preparations - classification. The history of immunization. Vaccines - classification, characteristics. Requirements to vaccines. Complications, contraindications. Scheme of vaccine administration. The immunological antibody-based preparations. Classification. Monoclonal antibodies. Characteristic. Rules of vaccine and serum injection. Immunomodulators : using, classification.

Section 5. Special Immunology

Topic 17. Anti-infectious immunity: antibacterial, antiviral, antifungal antiparasitic immunities.

Local immunity - skin and mucous membranes. Mechanisms of antibacterial and antitoxic immunity. Mechanisms of antiviral immunity. Features of antifungal immunity. Features of immunity in protozoa and helminthes infestations.

Topic 18. Non-infectious immunity: transplantation immunity, immunity in pregnancy, tumor immunity.

Transplantation immunity, its mechanisms. Immunity in tumors. Features of immunity in pregnancy. Age features of immunity.

Section 1. General Immunology

Topic 1. Immunology as a science. Immunity, its classification. Structure of the immune system.

Questions:

1. Immunology, its definition, problems.
2. The history of immunology, the main periods in the development of immunology.
3. The concept of immunity. Classification of immunity.
4. Sections of modern immunology.
5. Structure of the immune system.

Topic 2. Organs and cells of the immune system.

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Questions:

1. Primary organs of the immune system.
2. Secondary organs of the immune system.
3. The role of blood cells in immunity.
4. Immunocompetent cells: definition, classification.
5. The main cell populations of the immune system.

Topic 3. Mechanism of interaction of immune cells in immune response. Types of immune response. Theories of immune response.

Questions:

1. The forms of immune response. The mechanism of interaction of immune cells.
2. Theories of immune response. Side-chain theory.
3. Template theories.
4. Selection theories.
5. Jernes Network Hypothesis.

Topic 4. Innate immunity. Factors of the innate immunity. Mechanical, chemical and physiological barriers.

Questions:

1. The concept of a non-specific (innate) immunity.
2. The main barriers of nonspecific immunity.
3. The innate immune factors - the skin, mucous membranes.
4. Normal microflora, its role in human immunity.

Topic 5. Humoral mechanisms of the innate immunity.

Questions:

1. Lysozyme - chemical composition, functions.
2. Complement - chemical composition and its functions.
3. Pathways of complement activation.
4. Cytokines - classification, properties. The clinical significance of cytokine detection.
5. Interferon - chemical composition, properties. Classification.
6. Interleukins: definition, classification, its role.
7. Protective serum proteins - acute phase reactants, C-reactive protein (CRP), β -

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lysine, mannose proteins, properdin, fibronectin.

Topic 6. Cellular mechanisms of the innate immunity

Questions:

1. Phagocytosis, mononuclear phagocyte system.
2. The functions of phagocytes. Opsonins.
3. Phagocytosis mechanism, stages of phagocytosis. "Oxygen burst." Complete and incomplete phagocytosis.
4. Indicators of activity of phagocytes - phagocytic index, opsonic index.

Topic 7. Antigens: definition, classification.

Questions:

1. Antigens: definition, chemical composition.
2. The structure of the antigen.
3. Properties of antigens: antigenicity, immunogenicity, specificity, foreignness.
4. Types of antigens according to the degree of foreignness.
5. Classification antigens on its origin, chemical structure, the degree of immunogenicity.
6. Classification of antigens by the immune response. Haptens. Adjuvants.
7. The antigens of the human body.
8. Major histocompatibility complex. MHC class I. MHC class II.
9. The antigens of bacteria, viruses, tumor antigens.
10. Ways of penetration of antigens into the human body.

Topic 8. Antibodies: definition, classes of immunoglobulins.

Questions:

1. Antibodies: definition. The structure of the immunoglobulin.
2. Immunoglobulin classes. Serum immunoglobulins.
3. The properties of antibodies.
4. Phases of antibody synthesis.
5. Functions of antibodies.

Topic 9. Immunological memory. Immunological tolerance. Colloquium.

Questions:

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1. Immunological memory: definition, mechanisms.
2. Advantages and disadvantages of immunological memory.
3. Immunological tolerance: definition, classification.
4. Mechanisms of immunological memory. The using of immunological memory in medicine.

Section 2. Allergology.

Topic 10. Hypersensitivity.

Questions:

1. Hypersensitivity, its definition. The definition of allergy, stages of allergic reaction.
2. Classification of allergies.
3. I type reactions of immediate type hypersensitivity: anaphylaxis (mechanism of development, manifestations of anaphylaxis, principles of therapy). Anaphylactic shock. Atopy.
4. II type of immediate hypersensitivity: cytotoxic: mechanisms of development, clinical manifestations.
5. III type of immediate hypersensitivity reactions: immune complex: mechanisms of development, clinical manifestations.
6. Delayed type of hypersensitivity: mechanism of development, manifestations of contact allergy.
7. Classification of allergens. Infectious allergy.
8. Drug allergies: the immune response to the drug-haptens, clinical manifestations of drug allergy.
9. The principles of treatment and prevention of drug allergy.
10. Laboratory diagnosis of allergies.

Section 3. Clinical Immunology.

Topic 11. Pathologies of the immune system. Immunodeficiencies.

Questions:

1. The definition of immunodeficiency, the classification of immune deficiencies. Causes of congenital immunodeficiency states.
2. Primary immunodeficiencies: characteristics, classification. Combined immunodeficiencies.
3. Secondary (acquired) immunodeficiency: characteristics, classification.
4. The causes of acquired immune deficiencies.
5. Clinical manifestations of immunodeficiency states. Factors affecting the immune status.

Topic 12. Autoimmune diseases.

Questions:

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1. Autoimmunity, its mechanism.
2. Autoimmune diseases: definition, classification.
3. Cytotoxic autoimmune reactions: Graves' disease.
4. Immune complex autoimmune reactions: Systemic lupus erythematosus, rheumatoid arthritis.
5. Cell-Mediated autoimmune reactions: Multiple sclerosis, Insulin-dependent diabetes mellitus.

Topic 13. Evaluation of the immune status.

Questions:

1. Laboratory diagnosis of immunopathological diseases in children and adults: methods, assessment criteria, interpretation.
2. Methods of assessing the immune status.
3. The levels of assessment of immune status.
4. General rules of immunograms evaluation.

Topic 14. Serological tests: definition, classification. Simple and complex serological tests.

Questions:

1. The main principles and aims of the serological tests in medical practice.
2. Agglutination test and indirect (passive) haemagglutination test (PHAT): definition, mechanism, and practical use.
3. Precipitation reaction: identification, mechanism, types, practical use.
4. Agglutination and precipitation sera: preparation, titration, practical use.
5. Complement fixation test (CFT): the aim of its carrying out, components, mechanisms.

Topic 15. Serological tests using labeled antibodies and antigens (ELISA, IFT, RIA)

Questions:

1. Immunofluorescent test (IFT): the variety, aim of its carrying out, components, mechanism.
2. Enzyme linked immunosorbent assay (ELISA): the purpose of its carrying out, components, mechanism.
3. Radioimmunoassay (RIA): the purpose of its carrying out, components, mechanism.
4. Western blot: mechanism, using.

Section 4. Immunotherapy

Topic 16. Specific prevention and treatment of infectious diseases. Immunization. Immunotherapy.

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Questions:

1. Immunoprophylaxis, immunotherapy: definitions. Immunobiological preparations - group, the route of administration.
2. The history of immunization.
3. Vaccines - classification, characteristics.
4. Anatoxins - obtaining, application.
5. Requirements to vaccines. Complications, contraindications. Scheme administration.
6. Vaccine.
7. The immunological antibody-based drugs. Classification. Characteristic.
8. Rules of vaccines and serums.
9. Immunomodulators : using, classification.

Section 5. Special Immunology.

Topic 17. Anti-infectious immunity: antibacterial, antiviral, antifungal antiparasitic immunities.

Questions:

1. Features of local immunity - skin and mucous membranes.
2. Antibacterial and antitoxic immunity. Factors of antibacterial immunity.
3. Antiviral immunity.
4. Features of antifungal immunity.
5. Features of immunity in protozoa infestations.
6. Features of parasitic immunity.

Topic 18. Non-infectious immunity: transplantation immunity, immunity in pregnancy, tumor immunity.

Questions:

1. Transplantation immunity.
2. Immunity in tumors.
3. Immunity of pregnancy.
4. Age features of immunity. Neonatal immunity.

7. LABORATORY CLASSES: this type of work is not provided by the curriculum.

8. TOPICS OF COURSE, CONTROL WORKS, ABSTRACTS: this type of work is not provided by the curriculum.

9. LIST OF QUESTIONS FOR THE OFFSET:

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1. Immunology, its definition, problems. Sections of modern immunology.
2. The history of immunology, the main periods in the development of immunology.
3. The concept of immunity. Classification of immunity.
4. Structure of the immune system.
5. The central organs of the immune system. The peripheral organs of the immune system.
6. The role of blood cells in immunity.
7. Immunocompetent cells: definition, classification.
8. The main cell populations of the immune system.
9. The forms of immune response.
10. The mechanism of interaction of immune cells.
11. The concept of a non-specific (innate) immunity. The main barriers of nonspecific immunity.
12. The innate immune factors - the skin, mucous membranes, the normal microflora, lysozyme. Lysozyme - chemical composition, function.
13. Complement - chemical composition and functions.
14. The activation of the complement pathway.
15. Phagocytosis, mononuclear phagocyte system. The functions of phagocytes. Opsonin.
16. Phagocytosis mechanism stage. "Oxygen explosion." Complete and incomplete phagocytosis.
17. Indicators of activity of phagocytes - phagocytic index, opsono-phagocytic index.
18. Cytokines - classification, properties. The clinical significance of cytokines detection.
19. Interferon - chemical composition, properties. Classification.
20. Protective serum proteins - acute phase proteins, C-reactive protein (CRP), β -lysozyme, mannose proteins, properdin, fibronectin.
21. Antigens: definition, chemical composition.
22. The structure of the antigen.
23. Properties of antigens: heterogeneity, immunogenicity. Types of antigens according to the degree of foreignness.
24. Specificity antigens, types antigenic specificity.
25. Classification antigens on its origin, chemical structure, the degree of immunogenicity.
26. Classification of antigens by the immune response. Haptens. Adjuvants.
27. The antigens of the human body.
28. The antigens of bacteria, viruses, tumor antigens. Autoantigens.
29. Ways of penetration of antigens in the macro-organism.
30. Antibodies: definition, structure.
31. The structure of the immunoglobulin, immunoglobulin classes. Serum immunoglobulins.
32. The properties of antibodies.

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33. Phases of antibody synthesis.
34. The antibody functions in the formation of an immune complexes.
35. Hypersensitivity, its definition. The definition of allergy, stages of allergic reaction.
36. Classification of allergies.
37. I type reactions of immediate type hypersensitivity: anaphylaxis (mechanism of development, manifestations of anaphylaxis, principles of therapy). Anaphylactic shock. Atopy.
38. II type of immediate hypersensitivity: cytotoxic: mechanisms of development, clinical manifestations.
39. III type of immediate hypersensitivity reactions: immune complex: mechanisms of development, clinical manifestations.
40. Delayed type of hypersensitivity: mechanism of development, manifestations of contact allergy.
41. Classification of allergens. Infectious allergy.
42. Drug allergies: the immune response to the drug-haptens, clinical manifestations of drug allergy. The principles of treatment and prevention of drug allergy.
43. Laboratory diagnosis of allergies.
44. Immunological memory: concept, mechanisms. Immunological tolerance: concept, causes, mechanisms.
45. Classification of immunological tolerance. Using the phenomenon of immunological tolerance to solve medical problems. Artificial cancellation state of immunological tolerance.
46. The definition of immune deficiency, the classification of immune deficiencies.
47. Causes of congenital immunodeficiency states. Primary immunodeficiencies: characteristics, classification. Combined immunodeficiencies.
48. Secondary (acquired) immunodeficiency: characteristics, classification. The causes of acquired immune deficiencies.
49. Clinical manifestations of immunodeficiency states. Factors affecting the immune status.
50. Autoimmunity, its mechanism.
51. Autoimmune diseases: definition, classification.
52. Cytotoxic autoimmune reactions: Graves' disease.
53. Immune complex autoimmune reactions: Systemic lupus erythematosus, rheumatoid arthritis.
54. Cell-Mediated autoimmune reactions: Multiple sclerosis, Insulin-dependent diabetes mellitus.
55. Laboratory diagnosis of immunopathological diseases in children and adults: methods, assessment criteria, interpretation.
56. Methods of assessing the immune status.
57. The levels of assessment of immune status. General rules of immunograms evaluation.
58. The main principles and aims of the serological tests in medical practice.

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59. Agglutination test and indirect (passive) haemagglutination test (PHAT): definition, mechanism, and practical use.
60. Precipitation reaction: identification, mechanism, types, practical use. Agglutination and precipitation sera: preparation, titration, practical use.
61. Complement fixation test (CFT): the aim of its carrying out, components, mechanisms.
62. Immunofluorescent test (IFT): the variety, aim of its carrying out, components, mechanism.
63. Enzyme linked immunosorbent assay (ELISA): the purpose of its carrying out, components, mechanism.
64. Radioimmunoassay (RIA): the purpose of its carrying out, components, mechanism.
65. Immunoprophylaxis, immunotherapy: definitions. Immunobiological preparations - group, the route of administration.
66. The history of immunization.
67. Vaccines - classification, characteristics. Anatoxins - obtaining, application.
68. Requirements to vaccines. Complications, contraindications. Scheme administration.
69. The immunological antibody-based drugs. Classification. Characteristic.
70. Rules of vaccines and serums.
71. Immunomodulators : using, classification.
72. Features of local immunity - skin and mucous membranes.
73. Antibacterial and antitoxic immunity. Factors of antibacterial immunity.
74. Antiviral immunity.
75. Features of antifungal immunity.
76. Features of immunity in protozoa infestations.
77. Features of parasitic immunity.
78. Transplantation immunity.
79. Immunity in tumors.
80. Immunity of pregnancy.
81. Age features of immunity.

10.

SELF-STUDY WORK OF STUDENTS

Form of training full-time

The unit title	Type of self-study work	Amount of hours	Type of control
Immunology as a science. Immunity, its classification. Structure of the immune system.	Preparation for classes, performing of tasks for self-guided work in the copybooks	2	Discussion of home tasks, checkup of tasks in copybook

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Organs and cells of the immune system.	Preparation for classes, performing of tasks for self-guided work in the copybooks, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook, checkup of presentation
Mechanism of interaction of immune cells in immune response. Types of immune response. Theories of immune response.	Preparation for classes, performing of tasks for self-guided work in the copybooks	2	Discussion of home tasks, checkup of tasks in copybook
Innate immunity. Factors of the innate immunity. Mechanical, chemical and physiological barriers.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Humoral mechanisms of the innate immunity	Preparation for classes, performing of tasks for self-guided work in the copybooks, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Cellular mechanisms of the innate immunity	Preparation for classes, performing of tasks for self-guided work in the copybooks	2	Discussion of home tasks, checkup of tasks in copybook
Antigens: definition, classification.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract	2	Discussion of home tasks, checkup of tasks in copybook
Antibodies: definition, classes of immunoglobulins.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources,	2	Discussion of home tasks, checkup of tasks in copybook

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	writing of abstract, preparation of multimedia presentations		
Immunological memory. Immunological tolerance.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Hypersensitivity	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Pathologies of the immune system. Immunodeficiencies.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Autoimmune diseases.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Evaluation of the immune status	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with	2	Discussion of home tasks, checkup of tasks

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	literature and other information sources, writing of abstract, preparation of multimedia presentations		in copybook
Serological tests: definition, classification. Simple and complex serological tests.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Serological tests using labeled antibodies and antigens (ELISA, IFT, RIA)	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Specific prevention and treatment of infectious diseases. Immunization. Immunotherapy.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Anti-infectious immunity: antibacterial, antiviral, antifungal antiparasitic immunities.	Preparation for classes, performing of tasks for self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations	2	Discussion of home tasks, checkup of tasks in copybook
Non-infectious immunity: transplantation immunity,	Preparation for classes, performing of tasks for	2	Discussion of home tasks,

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immunity in pregnancy, tumor immunity.	self-guided work in the copybooks, work with literature and other information sources, writing of abstract, preparation of multimedia presentations		checkup of tasks in copybook
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11. INSTRUCTIONAL AND INFORMATION SUPPORT OF THE SUBJECT

a) the list of recommended literature

general

1) 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>

2) Artamonova, M. N. Medical Microbiology, Virology and Immunology. Lecture Notes : textbook / Artamonova M. N., Potaturkina-Nesterova N. I., Ilyina N. A., Nemova I. S. - Москва : ГЭОТАР-Медиа, 2021. - 352 с. - ISBN 978-5-9704-6043-6. - Текст: электронный // ЭБС "Консультант студента" : [сайт]. – URL : <https://www.studentlibrary.ru/book/ISBN9785970460436.html>

Additional

1) Artamonova M. N. Immunology : guidelines for practical classes for foreign students / M. N. Artamonova, N. I. Potaturkina-Nesterova, I.S. Nemova; Ulyanovsk State University, The Institute of Medicine, Ecology and Physical Culture. - Ulyanovsk : ULSU, 2017. - На англ. яз.; Загл. с экрана. - Электрон. текстовые дан. (1 файл : 1,70 МБ). - Текст : электронный. <http://lib.ulsu.ru/MegaPro/Download/MObject/911>

2) Островцова С. А. General Microbiology and Immunology. Summaries of the lectures = Общая микробиология и иммунология. Краткий курс лекций: пособие для студентов учреждений высшего образования, обучающихся на английском языке по специальности «Лечебное дело» : training appliance for Medical Faculty for International Students (English medium) / С. А. Островцова, А. И. Жмакин. - 2-е изд.. - Гродно : ГрГМУ, 2019. - 264 с. - ISBN 9789855951774. - Текст : электронный // ЭБС "Букар" : [сайт]. - URL :

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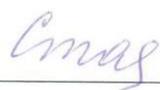
<https://www.books-up.ru/ru/book/general-microbiology-and-immunology-summaries-of-the-lectures-12050876/>

educational methodological

1) Artamonova M. N.

Guidelines for students' self-guided work for the discipline «Immunology» for specialty 31.05.01 «General medicine» / M. N. Artamonova, N. I. Potaturkina-Nesterova; Ulyanovsk State University. - Ulyanovsk : ULSU, 2022. - 24 p. - Неопубликованный ресурс; На англ. яз. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/11551> . - Режим доступа: ЭБС УлГУ. - Текст : электронный.

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The main librarian / Stadolnikova D.R. /  / 19.04.22
 The position of the worker scientific library Full name signature date

b) Professional databases, information and reference 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 //

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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 «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-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.

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12. MATERIAL AND TECHNICAL SUPPORT OF THE SUBJECT

Specialized training laboratory microbiology must have individual jobs for students, equipped with microscopes, and facilities for making micropreparations, bacteriological research and productions of immunological reactions (dyes, alcohol lamp, racks, trays, bacterial loop, tubes, automatic dispensers, pipettes, sets disks with antibiotics thermostat, vaccines, sera, diagnostic preparations). It also requires basic equipment for the preparation and storage of culture media and disinfection / sterilization: autoclave ("clean" and "dirty"), dry-heat sterilizer, distiller, fridge. Visual aids (tables, posters and are fixed preparations of bacteria) in the diagnosis of major infectious diseases, and others.

13. SPECIAL CONDITIONS FOR STUDENTS WITH DISABILITIES OF HEALTH AND DISABILITIES

If it is necessary, students with disabilities (at the request of the student) may be offered the following options for perceiving information, according their individual psychophysical characteristics:

- for persons with visual impairment: printed information in large print; in the form of an electronic document; in the form of an audio file (translation of training materials into audio format; individual tasks and consultations;
- for persons with hearing impairment: in print; in the form of an electronic document; individual tasks and consultations;
- for persons with disorders of the musculoskeletal system: in print; in the form of an electronic document; in the form of an audio file; individual tasks and consultations.

If it is necessary to use partially or only 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.

Creators



signature

associate professor

position

Artamonova M. N.

full name



signature

professor

position

Potaturkina-Nesterova N. I.

full name