Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of Higher Education
"St. Petersburg State University of Veterinary Medicine"

APPROVED BY
Vice-Rector for Educational
Work and Youth Policy
_____ Sukhinin A.A.
April 10, 2026

Department of microbiology, virology and immunology

EDUCATIONAL WORK PROGRAM

for the discipline

«VIROLOGY»

The level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»
Full-time education
Education starts in 2026

Reviewed and adopted
at the meeting of the department
on March 02, 2026
Protocol No. 8
Head of the Department
of Microbiology, Virology and Immunology
Doctor of Biological Sciences, Professor
_____ A.A. Sukhinin

Saint Petersburg
2026

1. AIMS AND OBJECTIVES OF THE DISCIPLINE

The purpose of the discipline: - mastery of the theoretical foundations of virology and the acquisition of knowledge and skills in the prevention and treatment of viral diseases in animals.

Objectives of the discipline: study of the biology of viruses and their interaction with the infected organism; formation of the main directions for diagnosing viral diseases of animals; knowledge of modern virological methods of laboratory diagnostics.

2. THE LIST OF THE PLANNED RESULTS OF THE DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED RESULTS OF THE REALISED EDUCATIONAL PROGRAM

As a result of mastering the discipline, the student prepares for the following types of activities, in accordance with the educational standard of the FSE on 05.36.01 "Veterinary Medicine".

The field of professional activity:

13 Agriculture

The student's competencies formed (acquired) as a result of mastering the discipline

The education of the discipline should form the following competencies:

General professional competencies (GPC):

GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.

GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process.

GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status.

GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.

GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.

GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity.

GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.

GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well.

GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.

GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services.

GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed.

GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level.

GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.

GPC-7 ID-1 To know: modern technical means and information technologies.

GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems.
GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE MPEP

The discipline B1.O.21 «VIROLOGY» according to the curriculum is a part formed by participants of educational process of the first block, it is mastered in full-time education in the 5th semester.

When teaching the discipline "Virology", the knowledge and skills acquired by students in mastering the disciplines are used - Cytology, histology and embryology, Biological physics, Inorganic and analytical chemistry, Inorganic chemistry, Analytical chemistry, Organic, Physical and colloid chemistry, Veterinary microbiology and mycology, Computer science and digital technologies. The discipline "Virology" is the basic one on which most subsequent disciplines are built, such as – Pathological physiology of animals, Animal physiology, Clinical diagnostics, Internal non-communicable diseases, Obstetrics and gynecology, Operative surgery with topographic anatomy, General and private surgery, Epizootology and infectious diseases animals, Veterinary radiobiology, Pathological anatomy of animals, Parasitology and invasive diseases of animals, Veterinary and sanitary examination.

4. THE SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

4.1. The scope of the discipline for full-time education

Type of educational work	**Hours**	**Semester 5**
Classroom classes (total)	68	68
Including:		
Lectures, including interactive forms	34	34
Practical lessons (PL), including interactive forms, among which are:	34	34
practical training (PT)	8	8
Self-study	76	76
Type of intermediate and final certification (test, exam)	Exam	Exam
Total labor intensity hours	**144**	**144**
Credits	4	4

5. THE CONTENT OF THE DISCIPLINE AND TYPES OF CLASSES

5.1. The content of the discipline (full-time education)

#	The title	Achieved competences	Semester	Types of academic work, including students' self-study and labor intensity (in hours)			
				Lectures	Practical lessons	Practical training	Self-study
1.	Virology and its tasks. History of virology. Characteristics of the basic properties of viruses. Preservation of viruses in nature. Resistance of viruses to physical and chemical factors. Virus inactivation is complete and partial. Genetics and variability of viruses.	**GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.	5	4			6
2.	Morphology, chemical composition and antigenic structure of viruses.	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems;	5	4			6

	Classification of viruses. Reproduction (multiplication) of viruses. Main stages of reproduction. Types of interaction of viruses with cells. Antiviral immunity and its features.	methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity.** GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
3.	Virology laboratory and its equipment. Safety precautions when working with viruses. Methods for purification and concentration of viruses.	**GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for	5	2	2		6

		implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
4.	Rules for taking, sending, storing and preserving virus-containing material. Preparation of Pat. material for laboratory diagnosis of viral diseases. Laboratory diagnostic methods. The order and sequence of virological diagnostics (diagnostic scheme).	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.	5	2	4		6

		GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
5.	Methods for preparing preparations for microscopy. Conventional microscopy in virology. Electron microscopy. Introduction to the electron microscope and preparation techniques. Luminescence microscopy: fluorochromization methods and fluorescent antibody method.	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.	5	2	2	2	6

		GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well.					
6.	Methods for isolating viruses in laboratory animals. Methods for isolating (isolating) viruses in chicken embryos (CE). Structure, methods of infection and opening of EC. Collection of virus-containing material. Tissue cultures in virology (CT), types and methods of obtaining CT, infection of tissue cultures with viruses. Setting up and recording RGAd and RZGAd. Determination of the infectious activity of viruses according to Reed and Mench (virus titer).	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.** GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services.	5	2	2	2	8

		GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed. GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level.					
7.	Serological reactions in virology. Essence, components, purpose. Establishment and accounting of RGA, RZGA, RNGA, RID, RIEOF, RSK, RN. Practical application for the diagnosis of viral diseases. Modern diagnostic methods in virology: enzyme-linked immunosorbent assay (ELISA) and molecular genetic method (PCR).	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies.	5	2	4	4	8

		GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
8.	Characteristics of viruses: infectious anemia (INAN), equine encephalitis, rinderpest and catarrhal fever viruses. foot and mouth disease, infectious rhinotracheitis (IRT), viral diarrhea, parainfluenza-3, res. sync. inf. Laboratory diagnostics. Biological products.	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.** GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services. GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed. GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information	5	6	4		10

		technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
9.	Characteristics of viruses: leukemia, smallpox, influenza, Marek's disease, avian laryngotracheitis, chicken bronchitis, Newcastle disease, infectious bursal disease, SSIA-76 and avian tenosynovitis. Laboratory diagnostics. Biological products.	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.** GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services. GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed. GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to	5	4	4		10

		solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
10.	Characteristics of viruses: Aujeszky's disease, classical and African swine fever, gastroenteritis and pneumonia of pigs, Teschen b., rabies, plasmacytosis (Aleutian disease), enteritis of minks and dogs, plague and hepatitis of carnivores. Laboratory diagnostics. Biological products.	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results. **GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.** GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services. GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed. GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to	5	6	4		10

		solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.					
TOTAL FOR THE SEMESTER:				**34**	**26**	**8**	**76**

6. THE LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR STUDENTS' SELF

6.1. Guidelines for independent work

1. Sukhinin A.A. Laboratory diagnosis of viral diseases: Textbook. / St. Petersburg, 2019.–124 p. (302 copies)

2. Virology: guidelines for studying the discipline for full-time, part-time (evening) and correspondence students in the specialty 36.05.01 "Veterinary Science" / A. A. Sukhinin, E. I. Prikhodko, I. V. Belkina [et al.]; Ministry of Agriculture of the Russian Federation, St. Petersburg State University of Veterinary Medicine. - St. Petersburg: FGBOU VO St. Petersburg State University of Veterinary Medicine, 2016. - 20 p. - Access mode: for authorized users of the Electronic Library of St. Petersburg State University of Veterinary Medicine. - Text: electronic. / Access mode: https://search.spbguvm.informsystema.ru/viewer.jsp?aWQ9NTIxJnBzPTIw (date of access: 02.03.2026).

6.2. Literature for independent work

1. Practical training in veterinary virology: textbook / N. I. Trotsenko, R. V. Belousova, E. A. Preobrazhenskaya. - 2nd ed., revised and enlarged. - Moscow: Kolos, 2000. - 272 p.: ill. - (Textbooks and teaching aids for students of higher educational institutions). - Text (visual): direct. / Access mode: https://search.spbguvm.informsystema.ru/card/1/3736?resultShowMode=BIBLIOCARD (access date: 02/03/2026).

2. Biotechnology in Virological Practice: a textbook for students, postgraduates and young scientists / compiled by N. A. Ozheredova; Stavropol State Agrarian University. - Stavropol: AGRUS, 2017. - 68 p. - Text (visual): direct / Access mode: https://search.spbguvm.informsystema.ru/card/1/13301?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

7. THE LIST OF BASIC AND ADDITIONAL LITERATURE NECESSARY FOR THE EDUCATION OF THE DISCIPLINE

7.1. Basic literature

. Practical training in veterinary virology / R. V. Belousova, N. I. Trotsenko, E. A. Preobrazhenskaya. - 3rd ed., revised and enlarged. - Moscow: KolosS, 2006. - 248 p.: ill. - (Textbooks and teaching aids for students of higher educational institutions). - Text (visual): direct. ISBN 5-9532-0307-1 Access mode:https://search.spbguvm.informsystema.ru/card/1/6848?resultShowMode=BIBLIOCARDS (access date: 02.03.2026).

2. Belousova R.V., Yarygina E.I., Tretyakova I.V. [et al.]. Virology and biotechnology [Electronic resource]: textbook - 3rd ed., stereo. - St. Petersburg: 2018. - 220 p. - ISBN 978-5-8114-2266-1 / Access mode: https://search.spbguvm.informsystema.ru/card/1/11792?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

3. Veterinary Virology / V. N. Syurin, R. V. Belousova, N. V. Fomina. - 2nd ed., revised and enlarged. - Moscow: Agropromizdat, 1991. - 431 p.: ill. - (Textbooks and teaching aids for students of higher educational institutions). - Text (visual): direct. ISBN 5-10-000684-6 / Access mode: https://search.spbguvm.informsystema.ru/card/1/8696?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

7.2. Additional literature

1. Veterinary Virology: approved by the Ministry of Agriculture of the Russian Federation as a textbook for university students studying in the specialty 111201-"Veterinary Science" / R. G. Gosmanov, N. M. Kolychev, V. I. Pleshakova. - 3rd ed., revised. and additional. - St. Petersburg: Lan,

2010. - 480 p. - (Textbooks for universities. Specialized literature). - Text (visual): direct. ISBN 978-5-8114-1073-6/ Access mode: https://search.spbguvm.informsystema.ru/card/1/9956?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

2. Veterinary Virology: a textbook / P. I. Baryshnikov. - Moscow: FORUM, 2007. - 96 p.: ill. - (Higher education). - Text (visual): direct. ISBN 978-5-91134-162-6 / Access mode: https://search.spbguvm.informsystema.ru/card/1/7295?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

3. Veterinary Virology: textbook / R. V. Belousova, E. A. Preobrazhenskaya, I. V. Tretyakov; edited by R. V. Belousova. - Moscow: KolosS, 2007. - 424 p.: ill. - (Textbooks and teaching aids for students of higher educational institutions). - Text (visual): direct. ISBN 978-5-9532-0416-3 / Access mode: https://search.spbguvm.informsystema.ru/card/1/7142?resultShowMode=BIBLIOCARD (access date: 02.03.2026).

8. THE LIST OF RESOURCES OF THE INFORMATION AND TELECOMMUNICATION NETWORK "INTERNET" NECESSARY FOR EDUCATION OF THE DISCIPLINE

To prepare for laboratory classes and perform self-work, students can use the following online resources:

1. https://meduniver.com – medical information site.
2. Meduniver.com – medical information site.

Electronic library systems

1. ELS "SPBGUVM"
2. University information system "RUSSIA"
3. Full-text database POLPRED.COM
4. Scientific electronic Library ELIBRARY.RU
5. Russian Scientific Network
6. Full-text interdisciplinary database on agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE
7. Electronic books of the publishing house "Prospekt Nauki" http://prospektnauki.ru/ebooks/
8. Collection "Agriculture. Veterinary medicine" publishing house "Quadro" ELS "Elibris" publishing house "Quadro" https://elibrica.com/

9. METHODOLOGICAL GUIDELINES FOR STUDENTS ON EDUCATION OF THE DISCIPLINE

Methodological recommendations for students are a set of recommendations and explanations that allow them organize the process of studying this discipline optimally.

The content of methodological recommendations, as a rule, may include:

• Tips on planning and organizing the time needed to study the discipline. Description of the sequence of actions of the student, or the "scenario of studying the discipline".

Morning time is the most effective for academic work (from 8-14 hours), followed by afternoon time (from 16-19 hours) and evening time (from 20-24 hours). The most difficult material is recommended to be studied at the beginning of each time interval after rest. After 1.5 hours of work, a break is required (10-15 minutes), after 4 hours of work, the break should be 1 hour. Part of the scientific organization of labor is the master of the technique of mental labor. Normally, a student should devote about 10 hours a day to studying (6 hours at university, 4 hours at home).

The methodology of work when taking notes of oral presentations differs significantly from the methodology of work when taking notes of written sources.

By taking notes of written sources, the student has the opportunity to read again the desired passage of the text, reflect on it, highlight the main thoughts of the author, briefly formulate them, and then write them down. If necessary, he can also note his attitude to this point of view. Listening to the

lecture, the student should transist most of the complexity of the above–mentioned works for another time, trying to use every minute to record the lecture, and not to comprehend it - there is no time left for this. Therefore, when taking notes of a lecture, it is recommended, to leave separate fields on each page for subsequent entries in addition to the summary.

After recording a lecture or making a summary of it, you should not leave work on the lecture material before preparing for the test. It is necessary to do as early as possible the work that accompanies takimg notes of written sources, the last could not be done during the recording of the lecture - read your notes, deciphering individual abbreviations, analyze the text, establish logical connections between its elements, in some cases show them graphically, highlight the main thoughts, mark issues, requiring additional processing, in particular, the teacher's consultations.

When working on the text of the lecture, the student should pay special attention to the problematic issues, raised by the teacher, during the lecture, as well as to his assignments and recommendations.

For each lecture, practical lesson and laboratory work, classification cod, topic, list of issues under consideration, volume in hours and links to recommended literature are provided. For classes conducted in interactive forms, its organizational form should be indicated: computer simulation, business or role-playing game, analysis of a specific situation, etc.

• Recommendations for preparing for practical classes

Practical (seminar) classes are an important part of the professional training of students. The main purpose of conducting practical (seminar) classes is to form students' analytical, creative thinking through the acquisition of practical skills. Practical classes are also conducted in order to deepen and consolidate the knowledge gained in lectures and in the process of independent work on normative documents, educational and scientific literature. For student, it is necessary, to study or repeat theoretical material on a given topic when preparing for a practical lesson for students.

When preparing for a practical lesson, the student is recommended to follow the following algorithm;

1) get acquainted with the plan of the upcoming lesson;

2) study the literature sources that have been recommended and familiarize yourself with the introductory notes to the relevant sections.

Methodological guidelines for practical (seminar) classes in the discipline, along with the work program and schedule of the educational process, refer to methodological documents that determine the level of organization and quality of the educational process.

The content of practical (seminar) classes is recorded in the working curricula of the disciplines in the sections "List of topics of practical (seminar) classes".

The most important component of any form of practical training are tasks. The basis of the task is an example that is understood from the standpoint of the theory developed in the lecture. As a rule, the main attention is paid to the formation of specific skills, which determines the content of students' activities - problem solving, laboratory work, clarification of categories and concepts of science, which are a prerequisite for correct thinking and speech.

Practical (seminar) classes perform the following tasks:

- stimulate regular study of recommended literature, as well as attentive attitude to the lecture course;
- consolidate the knowledge gained in the process of lecture training and independent work on literature;
- expand the scope of professionally significant knowledge, skills, and abilities;
- allow you to verify the correctness of previously acquired knowledge;
- initiate skills of independent self-thinking, oral presentation;
- contribute to the free use of terminology;
-provide the teacher with the opportunity to systematically monitor the level of independent work of students.

Methodological guidelines for practical (seminar) classes on the discipline should be focused on modern business conditions, current regulatory documents, advanced technologies, the latest

achievements of science, technology and practice, modern ideas about certain phenomena, the studied reality.

• Recommendations for working with literature.

Working with literature is an important stage of the student's self-work on mastering the subject, contributing not only to the consolidation of knowledge, but also to the expansion of horizons, mental abilities, memory, the ability to think, express and confirm personal hypotheses and ideas. In addition, the skills of research work necessary for further professional activityare developed.

When starting to study the literature on the topic, it is necessary to make notes, extracts, notes. It is mandatory to take notes of the works of theorists, which allow us to comprehend the theoretical basis of the study. For the rest, you can limit yourself to summary from the studied sources. All summaries and quotations must have the exact "return address" (author, title of the work, year of publication, page, etc.). It is advisable to write an abbreviated title of the question to which the extract or quotation refers. In addition, it is necessary to learn how to immediately compile a file of special literature and publications of sources, both proposed by the teacher and identified independently, as well as refer to bibliographic reference books, chronicles of journal articles, book chronicles, abstract journals. At the same time, publications of sources (articles, book titles, etc.) should be written on separate cards, which must be filled in according to the rules of bibliographic description (surname, initials of the author, title of the work. Place of publication, publisher, year of publication, number of pages, and for journal articles – the name of the journal, year of publication, page numbers). On each card, it is advisable to record the thought of the author of the book or a fact from this book on only one specific issue. If the work, even in the same paragraph or phrase, contains more judgments or facts on another issue, then they should be written out on a separate card. The presentation should be concise, accurate, without subjective assessments. On the back of the card, you can make your own notes about this book or article, its content, structure, on which sources it is written, etc.

• Explanations about working with control and test materials for the course, recommendations for completing homework.

Testing allows you to determine whether the actual behavior of the program corresponds to the expected one by performing a specially selected set of tests. A test is the fulfillment of certain conditions and actions necessary to verify the operation of the function under test or part of it. Each question in the discipline must be answered correctly by choosing one option.

10. EDUCATIONAL WORK

As part of the implementation of the discipline, educational work is carried out to form a modern scientific worldview and a system of basic values, the formation and development of spiritual and moral, civil and patriotic values, a system of aesthetic and ethical knowledge and values, attitudes of tolerant consciousness in society, the formation of students' need for work as the first vital necessity, the highest value and the main way to achieve success in life, to realize the social significance of your future profession.

11. THE LIST OF INFORMATION TECHNOLOGIES USED IN THE IMPLEMENTATION OF THE EDUCATIONAL PROCESS

11.1 Information technologies

For the educational process of the discipline is previewed the use of information technologies:

- practical classes using multimedia;
- interactive technologies (dialogues, collective discussion on various topics for realization a particular educational and professional task);
- interaction with students via e - mail;
- community work in the electronic information and educational environment of St. Petersburg State University: https://spbguvm.ru/academy/eios/

11.2. Software
The list of licensed and free- distributed software, including national programs

№ п/п	Technical and computer programs recommended by sections and topics of the program	License
1	MS PowerPoint	67580828
2	LibreOffice	free software
3	OS Alt Education	AAO.0022.00
4	ABIS “ MARK-SQL”	02102014155
5	MS Windows 10	67580828
6	System Consult Plus	503/КЛ
7	Android OS	free software

12. THE MATERIAL AND TECHNICAL BASE NECESSARY FOR THE IMPLEMENTATION OF THE DISCIPLINE EDUCATIONAL PROCESS

The title of the discipline (module), practice in accordance with the curriculum	The title of special rooms and rooms for self-work	Equipment of special rooms and rooms for self-work
B1.O.21 «VIROLOGY»	412 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector, screen, electrical connector for Internet access. Laboratory tables, medical laboratory metal cabinet, homogenizer, universal pH meter, comparator (Michaelis apparatus), magnetic stirrer, UV lamp, slides and cover glasses, alcohol burners , tank loops, tweezers, dye solutions, immersion oil rinsers with bridges, containers with disinfectant solutions, laboratory mixing device, biothermostat, Krotov apparatus, desiccator, microanaerostat, hot-air sterilizers of two different types, exhaust cabinet, water bath.
	422 (196084, St. Petersburg, Chernigovskaya st., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector, screen. Laboratory tables, medical laboratory metal cabinet, portable UVL lamp, slides and cover glasses, alcohol burners, loop tank, tweezers, dye solutions, immersion oil, rinsers with bridges, containers with disinfectant solutions, bottles for washing smears. Krotov apparatus, desiccator, microanaerostat, stands, test tubes with saline. solution. Device for filtration through ceramic candles, ceramic bacterial candles,

		microscopes, table lamps
	423 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers, dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat
	424 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers, dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat
	425 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers, dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat
	418 (washing room) room for preventive maintenance of equipment.	Household electric stove, electric water heater, laboratory tables, stands for drying test tubes, a stand for drying dishes, a cabinet for storing detergents and disinfectants, metal sterilizers, a trash can.
	419 autoclave	Steam sterilizers VK-75PT – 2 pcs., laboratory table for storing bins and stands.
	206 Large reading room (196084, St. Petersburg, Chernigovskaya str., 5) Room for self-work	*Specialized furniture:* tables, chairs *Technical means of education:* computers connected to the Internet and access to an electronic information and educational environment
	214 Small reading room (196084, St. Petersburg, Chernigovskaya str., 5) Room for self-work	*Specialized furniture:* tables, chairs *Technical means of education:* computers connected to the Internet and access to an electronic information and educational environment
	324 Information Technology Department (196084, St.	*Specialized furniture: tables,* chairs, special equipment, materials and spare parts for

	Petersburg, Chernigovskaya str., 5) Room for storage and preventive maintenance of educational equipment	preventive maintenance of technical training facilities
	Box No. 3 Carpentry workshop (196084, St. Petersburg, Chernigovsaya str., 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture: tables,* chairs, special equipment, materials and spare parts for preventive maintenance of technical training facilities

Developers:

Associate Professor of the Department of Microbiology, Virology and Immunology, Doctor of Veterinary Sciences  Pankratov S.V.

Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of higher education
"Saint Petersburg State University of Veterinary Medicine"

Department of microbiology, virology and immunology

FUND OF ASSESMENT TOOLS
for the discipline

«VIROLOGY»

Specialty 36.05.01 Veterinary medicine
Profile: «General clinical veterinary medicine»
Full-time education

Education starts in 2026

Saint Petersburg
2026

1. PASSPORT OF THE FUND OF ASSESMENT TOOLS

#	Acquired competence	Assessed modules of a discipline	Assesment tool
1	**GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.** GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process. GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status. GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies. **GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.** GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity. GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained. GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well. **GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.**	Virology and its tasks. History of virology. Characteristics of the basic properties of viruses. Preservation of viruses in nature. Resistance of viruses to physical and chemical factors. Virus inactivation is complete and partial. Genetics and variability of viruses.	Seminar, Test
2.		Morphology, chemical composition and antigenic structure of viruses. Classification of viruses. Reproduction (multiplication) of viruses. Main stages of reproduction. Types of interaction of viruses with cells.	Seminar, Test
3		Antiviral immunity and its features.	Seminar, Test
4		Virology laboratory and its equipment. Safety precautions when working with viruses. Methods for purification and concentration of viruses.	Seminar, Test
5		Rules for taking, sending, storing and preserving virus-containing material. Preparation of Pat. material for laboratory diagnosis of viral diseases. Laboratory diagnostic methods. The order and sequence of virological diagnostics (diagnostic scheme).	Seminar, Test
6		Methods for preparing preparations for microscopy. Conventional microscopy in virology. Electron microscopy. Introduction to the electron microscope and preparation techniques. Luminescence microscopy:	Seminar, Test

	GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services. GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed. GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level. **GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.** GPC-7 ID-1 To know: modern technical means and information technologies. GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems. GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.	fluorochromization methods and fluorescent antibody method.	
7		Methods for isolating viruses in laboratory animals. Methods for isolating (isolating) viruses in chicken embryos (CE). Structure, methods of infection and opening of EC. Collection of virus-containing material. Tissue cultures in virology (CT), types and methods of obtaining CT, infection of tissue cultures with viruses. Setting up and recording RGAd and RZGAd. Determination of the infectious activity of viruses according to Reed and Mench (virus titer).	Seminar, Test
8		Serological reactions in virology. Essence, components, purpose. Establishment and accounting of RGA, RZGA, RNGA, RID, RIEOF, RSK, RN. Practical application for the diagnosis of viral diseases. Modern diagnostic methods in virology: enzyme-linked immunosorbent assay (ELISA) and molecular genetic method (PCR).	Seminar, Test
9.		Characteristics of viruses: infectious anemia (INAN), equine encephalitis, rinderpest and catarrhal fever viruses. foot and mouth disease, infectious rhinotracheitis (IRT), viral diarrhea, parainfluenza-3, res. sync. inf. Laboratory diagnostics. Biological products.	Seminar, Test

10.		Characteristics of viruses: leukemia, smallpox, influenza, Marek's disease, avian laryngotracheitis, chicken bronchitis, Newcastle disease, infectious bursal disease, SSIA-76 and avian tenosynovitis. Laboratory diagnostics. Biological products.	

List of assessment tools

№	Name of the assessment tool	Brief description of the assesment tool	Presentation of the assessment tool in the fund
1.	Seminar	A means of control is organized as a conversation between the teacher and the student on topics related to the discipline, and designed to clarify the amount of knowledge that students have on a certain module, topic, problem, etc. May be conducted in written form.	Questions on topics/modules of the discipline presented in relation to the competencies provided by the work program of the discipline
2.	Test	A system of standardized tasks, which allows to automate the assessment of students knowledge and skills	A fund of test assignments

1. INDICATORS AND CRITERIA FOR ASSESSING COMPETENCIES AT VARIOUS STAGES OF ITS FORMATION, DESCRIPTION OF ASSESSMENT SCALES

Planned results of competency acquaired	The level of development				Assesment tool
	Unsatisfactory	Satisfactory	Good	Exellent	
GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.					
GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Seminar, Test
GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Seminar, Test
GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.	When solving standard problems basic skills were not demonstrated,	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Seminar, Test

	gross errors occurred				
GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.					
GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Seminar, Test
GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Seminar, Test
GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Seminar, Test
GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.					

GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Seminar, Test
GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Seminar, Test
GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Seminar, Test
GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.					
GPC-7 ID-1 To know: modern technical means and information technologies.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Seminar, Test

GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Seminar, Test
GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Seminar, Test

3. A LIST OF CONTROL TASKS AND OTHER MATERIALS, NECESSARY FOR THE ASSESSMENT OF KNOWLEDGE, SKILLS AND WORK EXPERIENCE

3.1. Typical tasks for the current control of academic progress

3.1.1 Test-questions

GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.

GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process.

1. Structure of a virology laboratory. Operating mode.
2. Technical support for the virology laboratory and safety precautions when working with viruses.
3. Taking, sending and preparing pathological material for virological research.

GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status.

4. General characteristics of viruses.
5. Properties of viruses.
6. Methods for diagnosing infectious diseases.
7. Laboratory methods for diagnosing viral diseases.

GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.

8. Microscopic research method. Conventional and microscopy.
9. Microscopic research method. Electron microscopy.
10. Luminescence microscopy, MF.
11. Luminescence microscopy, MFA.

5. The essence and methods of processing preparations for fluorescent microscopy.

GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.

GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity.

1. The device of a light microscope.
2. The luminescent microscope device.
   The device of the electron microscope.

GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.

3. Enzyme immunoassay (ELISA) in the diagnosis of diseases.
4. Polymerase chain reaction in the diagnosis of diseases.

GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well.

5. Virological method of diagnosis of viral diseases.
6. Serological method of diagnosis of viral diseases.
7. Molecular biological method of diagnosis of viral diseases

GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.

GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services.

9. The importance of viruses in nature and human life.
10. Subject, tasks of virology, its connection with other biological disciplines.
11. Achievements and prospects for the development of modern virology.

GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed.

12. Biological method. Goals and methods of infection of laboratory models.
13. Tissue and cell culture. Classification of tissue cultures. Methods for obtaining tissue cultures.
14. Use of cell cultures to study viruses; primary trypsinized, semi-transferable and continuous cultures, growth and maintenance nutrient media; isolation of viruses in cell culture.
15. Methods for infecting tissue cultures with viruses. The concept of CPD of viruses.
16. Indication of viruses in cell culture
17. Intracellular inclusions, cytopathological effect of viruses, plaque formation, interference phenomenon.

GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level.

18. Discovery of the main groups of viruses (works of D.I. Ivanovsky, M. Beyerinck, W. Stanley, F. Leffler and P. Frosch, P. Routh, F. Twort, F. d'Herelle).
19. Definition of the concept of “virus”, variety of viruses, principles of classification of animal and plant viruses.
20. Basic properties of viruses.

GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.

GPC-7 ID-1 To know: modern technical means and information technologies.

21. Spread of viruses, vertical transmission, horizontal transmission (pathways, mechanisms, examples).
22. Features of the epidemiology of viral infections, sources of infection.
23. Paths of penetration of viruses, classification of viral infections, epidemic process.
24. Use of bacteriophages. Titration of bacterial viruses.
25. Cellular and organismal stages of viral pathogenesis, spread of viruses in the host body and tropism to certain tissues, viremia, cytopathic effect induced by the virus in cells.

GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems.

26. Reaction of hemagglutination and hemadsorption.
27. Structure of a chicken embryo (picture).
28. Methods of infecting a chicken embryo.
29. Titration of viruses. Virus titer and method for determining virus titer. Virus titer units.
30. Serological methods in virology.
31. Types and essence of serological reactions for virological studies.
32. Identification of viruses in the neutralization reaction. Detection of virus-neutralizing antibodies in blood serum.

GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.

33. Virion structure;
34. Functions of protein structures of virions (receptor functions of proteins, outer membranes, enzymatic proteins of virions, matrix proteins, F-proteins).
35. Lipids and carbohydrates of viruses.
36. Interaction of proteins and nucleic acids during packaging of viral genomes
37. Types and principles of symmetry of viruses, examples of viruses with different types of symmetry.
38. The structure of complex viruses (bacteriophages, ortho- and paramyxoviruses, rhabdoviruses, retroviruses, togaviruses, vaccinia virus).

TEST

OPK-1 is capable of determining the biological status and normative clinical indicators of organs and systems of the animal body

D-1 OPK-1 Know safety precautions and personal hygiene rules when examining animals, methods of fixing them; schemes for clinical examination of an animal and the procedure for examining individual body systems, including using digital technologies; methodology for recognizing a pathological process.

ID-2OPK-1 Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals.

ID-3OPK-1 Possess practical skills in independently conducting a clinical examination of an animal using classical research methods and digital technologies.

CLOSED TYPE TASKS

Tasks of a combined type with the choice of one correct answer from the proposed options

Task 1.

How is the nucleotide sequence of the virus genome determined?

1. Serological reactions;
2. Bioassay;
3. Genome sequencing;
4. Electron microscopy;
5. PCR.

Answer: 3.

Task 2.

What property of viruses is taken into account when selecting pathological material for laboratory testing?

1. Type of nucleic acid;
2. Tissue tropism;
3. Reproduction;
4. Structure of the virus;
5. Ability to crystallize.

Answer: 2.

Task 3.

How are infectious diseases diagnosed?

1. Comprehensively, with confirmation by laboratory methods;
2. Based on clinical signs;
3. Based on pathomorphological changes;
4. Based on epizootic data;
5. Based on epidemiological data.

Answer: 1.

Task 4.
What methods are used to detect the titer of antiviral antibodies?
1. Bacterioscopic;
2. Molecular genetic;
3. Serological;
4. Virological;
5. Histological.
Answer: 3.

Task 5.
What material is used to determine the antibody titer?
1. Tubular bone;
2. Blood serum;
3. Brain;
4. Intestine with contents;
5. Saliva.
Answer: 2.

Closed-ended tasks to establish compliance

Task 6.
Establish a correspondence between the type of serological reaction and a positive result during visual assessment

Serological reaction		**Положительный результат**	
A	Hemagglutination inhibition test (HI)	1	Adsorption of erythrocytes on cell culture
B	Diffusion precipitation reaction (DPR)	2	Erythrocyte sedimentation in the form of a "button"
C	Complement fixation reaction (CFR)	3	Grey-white precipitation band
D	Hemadsorption inhibition reaction (HIAR)	4	Sedimentation of erythrocytes at the bottom in the form of an "umbrella"

Write the selected numbers in the table under the corresponding letters.

A	B	C	D

Answer: A-4; B-3; C-2; D-1.

Task 7.
Establish a correspondence between the type of serological reaction and the components of the reactions

Type of serological reaction		**Components of the reaction**	
A	Hemagglutination inhibition test (HIT)	1	Complement
B	Diffusion precipitation test (DPT)	2	Conjugate
C	Complement fixation test (CFT)	3	Rooster red blood cell suspension
D	Enzyme-linked immunosorbent assay (ELISA)	4	Difco agar gel in a Petri dish

Write the selected numbers in the table under the corresponding letters.

A	B	C	D

Answer: A-3; B-4; C-1; D-2.

Task 8.
Establish a correspondence between the type of microscopy and a positive result of a study in virology

Type of microscopy		Positive result	
A	Svetovaya mikroskopiya	1	Salatno-zelenoye ili drugoye svecheniye
B	Lyuminestsentnaya mikroskopiya	2	Nalichiye telets vklyucheniy
C	Elektronnaya mikroskopiya	3	Pozvolyayet uvidet' viriony i ikh strukturu

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-1; C-3.

Task 9.

Establish a correspondence between the type of capsid symmetry and the shape of the virion.

Capsid symmetry type		**Virion shape**	
A	Icosahedral symmetry type	1	iliform and rod-shaped form
B	Combined symmetry type	2	Club-shaped form
C	Spiral symmetry type	3	Spherical (isometric) form

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-2; C-1.

Task 10.

Establish a correspondence between the research method and the purpose of its application

Метод исследования		**Цель применения**	
A	Conventional microscopy	1	Detection and identification of the virus
B	Infection of biological models	2	Detection of inclusion bodies
C	Serological method	3	Isolation and accumulation of the virus
D	Immune fluorescence (IFA)	4	Determination of antibodies in blood serum

Write the selected numbers in the table under the corresponding letters.

A	B	C	D

Answer: A-2; B-3; C-4; D-1.

Closed-type tasks to establish a sequence

Task 11.

Establish the correct sequence of stages for determining the antibody titer in animal blood serum

1. Carrying out a serological reaction
2. Obtaining blood serum
3. Inactivating serum
4. Interpreting the results
5. Taking blood

Answer: 5; 2; 3; 1; 4.

Task 12.

Establish the correct sequence of stages for setting up the direct immune fluorescence method

1. Keeping in a humid chamber for 30-40 min, t-36-37°C
2. Drying, then fluorescence microscopy
3. Washing with saline or distilled water
4. Preparation of a preparation containing the antigen
5.Naneseniye spetsificheskoy fluorestsiruyushchey syvorotki

Otvet: 4; 5; 1; 3; 2.

Task 13.

Establish the correct sequence of stages for setting up the fluorochroming method

1. Staining the preparation with aniline dyes that have photoluminescent properties
2. Drying, then fluorescent microscopy
3. Preparing the preparation containing the antigen
4. Washing with saline or distilled water

Answer: 3; 1; 4; 2.

Task 14.
Establish the correct sequence of stages for preparing ultrathin sections for electron microscopy
1. Embedding the pathological material in epoxy resin
2. Mounting on a copper grid-substrate
3. Dehydration and compaction of the pathological material in a battery of alcohols
4. Selection of the pathological material
5. Preparation of ultrathin sections on an ultramicrotome
6. Special staining methods
7. Fixation of pat. material
Answer: 4; 7; 3; 1; 5; 2; 6.

Task 15.
Establish the correct sequence of stages for preparing a specimen for electron microscopy using a colloidal film
1. Mounting the colloidal film on a copper grid-substrate
2. Applying the virus suspension
3. Applying the liquid polymer to water
4. Staining
5. Washing with distilled water
Answer: 3; 1; 2; 5; 4.

OPEN TYPE ASSIGNMENT
Task 16.
What material is sent to the laboratory for rabies diagnostics, why?
Answer: The head, since the largest amount of the virus is localized in the brain.

Task 17.
How does rabies virus infection occur?
Answer: When healthy animals are bitten by sick ones.

Task 18.
In the diagnosis of which viral diseases is the neutralization reaction (NR) not used and why?
Answer: bovine leukemia, Aleutian mink disease, African swine fever, infectious equine anemia, since the animals' bodies do not produce virus-neutralizing antibodies to the pathogens of these diseases.

Task 19.
What viral diseases can be diagnosed using the hemagglutination inhibition test (HIT)? Why?
Answer: Newcastle disease, influenza, bovine parainfluenza-3, plague of carnivores, egg drop syndrome. The causative agents of these diseases have hemagglutinating properties.

Task 20.
What indicates a positive result when taking into account the immune fluorescence reaction? Justify your answer.
Answer: glow during fluorescence microscopy. After staining the preparation with a specific fluorescent serum, an antigen-antibody complex is formed, which is not washed off and will glow during fluorescence microscopy.

OPK-4 Capable of using in professional activities methods of solving problems using modern equipment in the development of new technologies and using modern professional methodology to conduct experimental research and interpret their results
ID-1OPK-4 Know the technical capabilities of modern specialized equipment, methods for solving problems of professional activity.
ID-2OPK-4 Be able to apply modern technologies, including digital ones, and research methods in professional activity, interpret the obtained results.
ID-3OPK-4 Possess skills in working with specialized equipment to implement assigned tasks when conducting research and developing new technologies, including digital ones

CLOSED-TYPE TASKS

Combined-type tasks with choosing one correct answer from the proposed options

Task 1.
What is the maximum resolution of an electron microscope?
1. 0.2 nm;
2. 20 μm;
3. 200 μm;
4. 0.2 mm;
5. 2.0 mm.
Answer: 1.

Task 2.
What type of equipment allows detecting intracellular viral inclusion bodies?
1. Thermocycler;
2. Electron microscope;
3. Light microscope;
4. Reader (spectrophotometer);
5. Thermostat.
Answer: 3.

Task 3.
What type of equipment allows studying the morphology of the virion?
1. Light microscope;
2. Fluorescent microscope;
3. Electron microscope;
4. Centrifuge;
5. Reader (spectrophotometer).
Answer: 3.

Task 4.
What kind of preparations are prepared for electron microscopy?
1. Imprint smears;
2. Smears;
3. Ultrathin histosections;
4. Infected cell culture grown on a cover glass;
5. Infected cell culture grown in a test tube.
Answer: 3.

Task 5.
What equipment is used to record the results of enzyme-linked immunosorbent assay (ELISA)?
1. Light microscope;
2. Fluorescent microscope;
3. Electron microscope;
4. Reader (spectrophotometer);
5. Thermal amplifier.
Answer: 4.

Closed-type tasks to establish correspondence

Task 6.
Establish a correspondence between the equipment and its use in the laboratory

Equipment		**Laboratory use**	
A	Laminar installation	1	Inactivation of blood serum
B	Ovoscope	2	Sterile conditions
C	Water bath	3	Quality assessment of chicken embryos

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-3; C-1.

Task 7.
Match the equipment with its use in the laboratory

Equipment		**Laboratory use**	
A	Amplifier	1	Reading the nucleotide sequence
B	Sequencer	2	Evaluation of the results of the immunofluorescence method (IFA)
C	Fluorescent microscope	3	PCR setup

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-1; C-2.

Task 8.
Match the equipment with its use in the laboratory

Equipment		**Laboratory use**	
A	Light microscope	1	Long-term storage of the virus
B	Reader (spectrophotometer)	2	Accounting for ELISA results
C	Low temperature chamber	3	Detection of intracellular inclusion bodies

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-2; C-1.

Task 9.
Match the equipment with its use in the laboratory

Equipment		**Laboratory use**	
A	Light microscope	1	Purification of viral material
B	Centrifuge	2	Assessment of cytopathogenic effect (CPE) of the virus
C	Thermostat	3	Cultivation of the virus on cell cultures and chicken embryos

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-1; C-3.

Task 10.

Compare the equipment used to perform serological reactions

Equipment			**Serological reaction**
A	Reader (spectrophotometer)	1	Enzyme-linked immunosorbent assay (ELISA)
B	Electrophoresis device	2	Immune fluorescence assay (IFA)
C	Fluorescence microscope	3	Immune electroosmophoresis reactions (IEOF)

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: А-1; Б-3; В-2.

Closed-ended tasks to establish a sequence

Task 11.

Put the stages occurring in the amplifier in the correct sequence

1. Elongation
2. Denaturation
3. Annealing

Answer: 2; 3; 1.

Task 12.

Establish the correct sequence of adding components to the plate for enzyme-linked immunosorbent assay (ELISA)

1. Adding the substrate
2. Adding with subsequent extraction of the test material
3. Adding the stop solution
4. Adding with subsequent extraction of the conjugate

Answer: 2; 4; 1; 3.

Task 13.

Establish the correct sequence of infecting a chicken embryo with virus-containing material

1. Introduce virus-containing material
2. Seal the holes in the shell with paraffin or wax
3. Place in a thermostat or thermal chamber
4. Ovoscope and make markings on the embryo shell
5. Make holes in the embryo shell
6. Flambé and treat with iodized alcohol

Answer: 4; 6; 5; 1; 2; 3.

Task 14.

Establish the correct sequence of stages of virus reproduction

1. Adsorption of the virus on the cell
2. Exit of the virus from the cell
3. Penetration of the virus into the cell
4. Undressing of the virus
5. Transcription
6. Translation

Answer: 1;3;4;5;6;2.

Task 15.
Put the stages of preparing pathological material for virological testing in the correct order
1. Centrifugation
2. Homogenization in a mortar
3. Washing off the preservative
4. Grinding with scissors
5. Freezing/defrosting
Answer: 3; 4; 2; 5; 1.

OPEN-ENDED TASK

Task 16.
What equipment is used for long-term storage of virus-containing material? Justify your answer.
Answer: Low-temperature freezers. Viruses are resistant to low temperatures.

Task 17.
What equipment is used to cultivate viruses on embryos and cell cultures? Justify your answer.
Answer: Thermostats (thermal chambers). A thermostat allows you to create the optimal temperature (37.5±0.5°C) necessary for normal development and maintaining the viability of bird embryos and cell cultures.

Task 18.
What equipment ensures the sequential flow of denaturation, annealing and elongation processes during PCR? Describe the temperature conditions and principles of these processes.
Answer: Amplifier. At a temperature of 95°C, the denaturation stage or unwinding of double-stranded DNA occurs, at a temperature of 50-65°C - annealing or attachment of primers, at a temperature of 72°C – elongation or synthesis of nucleic acid fragments.

Task 19.
What equipment is used to record the results of the immune fluorescence reaction (IFA)? What conditions must be met when recording the result?
Answer: Fluorescence microscope. Fluorescence microscopy must be carried out in a darkened room and non-fluorescent immersion oil must be used.

Task 20.
What equipment is used to carry out trypsinization of tissue pieces when obtaining cell cultures? What is the principle of trypsinization?
Answer: Magnetic stirrers.

OPK-6 Able to analyze, identify and assess the risk of occurrence and spread of diseases
ID-1OPK-6 Know existing programs for the prevention and control of zoonoses, contagious diseases, emerging or re-emerging infections, the use of animal identification systems, tracing and control by the relevant veterinary services.
ID-2OPK-6 Be able to conduct, including with the help of digital technologies, an assessment of the risk of occurrence of animal diseases, including the import of animals and animal products and other activities of veterinary services, animal products and feed.
ID-3OPK-6 Possess the skills to carry out procedures for identifying, selecting and implementing measures that can be used to reduce the level of risk

CLOSED-TYPE TASKS

Combined-type tasks with choosing one correct answer from the proposed options

Task 1.
How is a virus identified?
1. By infecting laboratory animals;
2. By infecting chicken embryos;
3. By setting up serological reactions;
4. By light microscopy;
5. By electron microscopy.
Answer: 3.

Task 2.
How are specific antibodies detected in blood serum?
1. By infecting laboratory animals;
2. By infecting chicken embryos;
3. By light microscopy;
4. By setting up

Task 3.
Where are inclusion bodies located in virus-infected cells?
1. On the nuclear membrane
2. In the cell wall;
3. Between cells
4. In the nucleus or cytoplasm;
5. On the cell wall.
Answer: 4.

Task 4.
How to prevent the spread of the rabies pathogen?
1. Vaccination of domestic and wild animals;
2. Mass destruction of wild animals;
3. Disinsection;
4. Disinfection;
5. Deratization.
Answer: 1.

Task 5.
What phenomenon of viruses is called hemagglutination?
1. Lyse erythrocytes;
2. Lyse leukocytes;
3. The ability to "glue" erythrocytes;
4. Infect erythrocytes;
5. Change the shape of erythrocytes.
Answer: 3.

Closed-type tasks to establish correspondence

Task 6.
Establish a correspondence between diseases caused by viruses and characteristic symptoms

Disease		**Symptoms**	
A	Rabies	1	Presence of aphthae (blisters) on the tongue and mucous membranes
B	Foot and mouth disease	2	Appearance of hemorrhages on the skin
C	African swine fever	3	Photophobia, hydrophobia

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-1; C-2.

Task 7.
Establish a correspondence between the designation of the average effective dose of the virus and the biological model used in titration

Mean effective dose of virus designation		**Biological model**	
A	ID_{50} and LD_{50}	1	Chicken embryos
B	EID_{50} and ELD_{50}	2	Laboratory animals
C	TCD_{50}	3	Cell culture

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-1; C-3.

Task 8.
Establish a correspondence between virological studies and the enzymes used?

Virological studies		**Enzymes used**	
A	PCR setup	1	PCR setup
B	Fluorescence microscopy with fluorochrome method	2	Fluorescence microscopy with fluorochrome method
C	Preparation of cell cultures	3	Preparation of cell cultures

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-1; B-3; C-2.

Task 9.
Establish a correspondence between the method of infection of laboratory animals and the tropism of the virus

Virus tropism		**Mode of infection**	
A	Neurotropic viruses	1	Scarification or intradermally
B	Dermatotropic viruses	2	Alimentary
C	Pneumotropic viruses	3	Into the brain or near the nerve nodes
D	Enterotropic viruses	4	Intranasally

Write the selected numbers in the table under the corresponding letters.

A	B	C	D

Answer: A-3; B-1; C-4; D-2.

Task 10.
What is the main serological reaction used to identify the following viruses?

Name of virus		**Serological reaction**	
A	Foot and mouth disease virus	1	Hemadsorption inhibition test (HIAT)
B	Aleutian mink disease virus	2	Immune electroosmophoresis test (IEO)
C	African swine fever virus	3	Complement fixation test (CFT)

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-2; C-1.

Closed-type tasks for establishing a sequence

Task 11.
Put the stages of setting up the RGA in the correct sequence using a polystyrene 96-well plate
1. Recording the reaction
2. Preparation of two-fold serial dilutions of the antigen in the wells
3. Shaking and exposure at room temperature, 30-60 min.
4. Adding physiological solution to all wells of the plate row
5. Adding 1% erythrocyte suspension to all wells
Answer: 4; 2; 5; 3; 1.

Task 12.
Establish the correct sequence of stages of the RGA
1. Addition of 0.5% erythrocyte suspension
2. Growing cell culture in test tubes
3. Infection of cell culture with virus
4. Exposure for 15 minutes
5. Recording the reaction using a light microscope
Answer: 2; 3; 1; 4; 5.

Task 13.
Establish the correct sequence of stages for setting up the RTGA
1. Adding 1% erythrocyte suspension to all wells
2. Adding a working dose (4 HAU) of antigen to all wells
3. Adding physiological solution to all wells of one row of the plate
4. Shaking and exposure at room temperature, 20-30 min.
5. Shaking and exposure for 40-60 min for interaction of antigen and antibodies
6. Preparation of two-fold serial dilutions of serum
7. Accounting for the reaction to detect hemagglutination delay
Answer: 3; 6; 2; 5; 1; 4; 7.

Task 14.
Establish the correct sequence of stages for determining the infectious activity of the virus
1. Infection of equal groups of biological models with each dilution
2. Preparation of 10-fold dilutions of virus-containing material
3. Calculation of infectious activity using the Reed and Mench method
4. Counting positively reacting models
Answer: 2; 1; 4; 3.

Task 15.
Put the stages of PCR in the correct order
1. Conducting PCR (amplification)
2. Taking samples
3. Interpreting results
4. Detection – identification of accumulated amplicons
5. Extracting nucleic acids (DNA or RNA) from samples
Answer: 2; 5; 1; 4; 3.

OPEN-ENDED TASK
Task 16.
What result is positive when taking into account the RSC?
Answer: No hemolysis and precipitation of erythrocytes at the bottom of the test tube.

Task 17.
What two components are always part of the serological reaction? One of them is always known, and the other is not.
Answer: Antigen and antibody.

Task 18.
What is the main serological reaction used for laboratory diagnostics of bird flu and Newcastle disease? Justify your answer?
Answer: Hemagglutination inhibition (delay) reaction RTGA (RZGA), since the causative agents of bird flu and Newcastle disease have hemagglutinating properties.

Task 19.
What molecular genetic methods can be used to identify the causative agent of a viral disease?
Answer: PCR, sequencing.

Task 20.
On the basis of what data and signs in viral diseases is a preliminary diagnosis made and further laboratory tests carried out?
Answer: On the basis of epizootological data, clinical signs (symptoms) and pathomorphological changes.

OPK-7 Able to understand the principles of operation of modern information technologies and use them to solve problems of professional activity
ID-1OPK-7 Know modern technical means and information technologies.
ID-2OPK-7 Be able to use them to solve analytical and research problems modern technical means and information technologies, including elements of machine learning and artificial intelligence.
ID-3OPK-7 Possess the skills of using modern technical means and information technologies to solve analytical and research problems.

CLOSED-TYPE TASKS

Combined-type tasks with choosing one correct answer from the proposed options

Task 1.
What temperature should be maintained when cultivating cell cultures and chicken embryos?
37.5°C;
25.0°C;
45.5°C;
15.5 °C;
5.5 °C.
Answer: 1.

Task 2.
What temperature should be maintained during long-term storage of viruses?
1. 37.5°C and above;
2. 4.0 – 37.5°C;
3. 0.0 – 4.0°C;
4. minus 15.5 – 0.0°C;
5. minus 70.0°C and below.
Answer: 5.

Task 3.
To what factors are viruses resistant?
1. To antibiotics;
2. To high temperatures;
3. To rotting;

4. To 3% formaldehyde solution;
5. To alkalis.
Answer: 1.

Task 4.
What growth factor does the growth nutrient medium for cultivating cell cultures contain?
1. Cattle blood serum;
2. Rooster erythrocytes;
3. Ram erythrocytes;
4. Trypsin;
5. Phenolrot.
Answer: 1.

Task 5.
What enzyme is used in PCR?
1. Primers;
2. Taq polymerase;
3. DNTf;
4. DNA ligase;
5. Restriction enzyme.
Answer: 2.

Closed-type tasks to establish correspondence
Task 6.
Establish a correspondence between the components and names of serological reactions

Components of serological reactions		**Name of serological reactions**	
A	Antibodies adsorbed on erythrocytes	1	Fluorescent antibody method (FAM)
B	Antibodies labeled with enzyme	2	Indirect hemagglutination assay (IHA)
C	Antibodies labeled with fluorescent dye	3	Enzyme-linked immunosorbent assay (ELISA)

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-3; C-1.

Task 7.
Establish a correspondence between the symptoms and viral diseases?

Name of the disease		**Symptoms**	
A	Flu	1	Formation of pustules
B	Carnivore Hepatitis	2	Yellowing of mucous membranes
C	Smallpox	3	Respiratory symptom complex

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-2; C-1.

Task 8.
Establish a correspondence between diseases that have similar clinical signs

Name of the disease		**Name of the disease**	
A	Rabies	1	Carnivore Hepatitis
B	Canine distemper	2	Aujeszky's Disease
C	Avian leukosis	3	Marek's Disease

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-2; B-1; C-3.

Task 9.
Match the pathogen and the susceptible animal.

Возбудитель болезни		**Вид животного**	
A	Egg Drop Syndrome Virus	1	Cats
B	Teschen Disease Virus	2	Pigs
C	Panleukopenia Virus	3	Chickens

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-3; B-2; C-1.

Task 10.
Match the pathogen and the susceptible animal.

The causative agent of the disease		**Animal type**	
A	Marek's disease virus	1	Chickens
B	Canine distemper virus	2	Dogs
C	Bluetongue disease virus	3	Sheep

Write the selected numbers in the table under the corresponding letters.

A	B	C

Answer: A-1; B-2; C-3.

Closed-type tasks to establish a sequence

Task 11.
Put the temperature change in one amplification cycle in the correct sequence
1. 50-65°C
2. 72°C
3. 95 °C
Answer: 3; 1; 2.

Task 12.
Establish the correct sequence of the virion structure, starting with the internal structure.
1. Supercapsid
2. Nucleoid (DNA or RNA)
3. Capsid
Answer: 2; 3; 1.

Task 13.
Establish the correct sequence of stages for conducting a virological study
1. Isolation of the virus by infecting laboratory models for at least 3-5 passages
2. Identification, typing of the virus by setting up serological reactions
3. Detection of the virus
4. Preparation of pathological material for research
Answer: 4; 3; 1; 2.

Task 14.
Establish the correct sequence of stages for conducting a virological study
1. Isolation of the virus by infecting laboratory models for at least 3-5 passages

2. Identification, typing of the virus by setting up serological reactions
3. Detection of the virus
4. Preparation of pathological material for research
Answer: 4; 3; 1; 2.

Task 15.
Arrange the stages of the neutralization reaction (NR) in the correct order
1. In the first row - add the same amount of specific serum
2. In the second row - add the same amount of normal serum
3. Prepare two rows of test tubes of 10-fold dilutions of virus-containing material
4. Infect laboratory models sensitive to the virus, observe
5. Calculate the virus titer and calculate the virus neutralization index
6. Place the test tubes in a thermostat at 37°C and keep for 1-2 hours.
7. Answer: 3; 1; 2; 6; 4; 5

OPEN-ENDED TASK

Task 16.
What biological models are used to isolate viruses?
Answer: Laboratory animals, chicken embryos (bird embryos), cell cultures (cell and tissue cultures).

Task 17.
What species of animals or birds are susceptible to the Marek's disease virus?
Answer: Chickens (birds).

Task 18.
Name the family of viruses that use the virus-specific enzyme reverse transcriptase during reproduction, describe its function.
Answer: Retroviruses (Retroviridae). After a retrovirus enters a host cell, reverse transcriptase converts the retroviral RNA genome into double-stranded DNA. This viral DNA then migrates to the nucleus and integrates into the host genome.

Task 19.
What method of infecting white mice is used to isolate the rabies virus? Justify your answer.
Answer: Into the tip of the nose. In this way, the rabies virus can most quickly reach the brain cells.

Task 20.
In what cases is PCR with reverse transcription used in virology?
Answer: When studying RNA-containing viruses

4.2.TYPICAL TASKS FOR INTERMEDIATE CERTIFICATION

4.2.1. List of questions for the test in “Virology”

GPC -1 Is able to determine the biological status, normal clinical signs of organs and systems of the animal body.

GPC-1 ID-1 To know: safety precautions and personal hygiene rules during the examination of animals, methods of its fixation; schemes of clinical examination of an animal and the procedure for examination individual body systems; methodology for diagnosis of the pathological process.

GPC-1 ID-2 To be able to: collect and analyze anamnesis data, conduct laboratory and functional studies, necessary to determine the animal biological status.

GPC-1 ID-3 To possess practical skills: for conducting on its own a clinical examination of an animal, using classical research methods and digital technologies.

1. Features of the virology laboratory and its equipment.
2. Virology. Advances and challenges of virology, its connection with other sciences.
3. Routes of transmission of viral diseases (examples). The concept of sterile and non-sterile immunity. Virus carriage.
4. Resistance of viruses to chemical and physical factors. Inactivation of viruses, complete and partial (examples).
5. Forms and structure of virions. Dimensions of viruses and methods of measuring them.
6. Genetics and variability of viruses. Types of variability and their practical significance (examples).
7. Principles of obtaining live antiviral vaccines and their control (examples).
8. Routes of transmission of viral diseases (examples). The concept of virus tropism.
9. Interferon. Interference of viruses and practical use of this phenomenon.
10. Conditions for storing and cultivating viruses in the laboratory. Preservation of viruses.
11. Types of interaction of viruses with cells.
12. Nonspecific factors of antiviral immunity and their role in protecting the body.
13. Characteristics of the main properties of viruses.
14. The concept of viruses and their classification. Name the families of RNA and DNA containing viruses.
15. Virus variability. Directional variability and its practical significance (examples).
16. Principles of obtaining inactivated (killed) vaccines for viral diseases.
17. Controls of inactivated vaccines (examples).
18. Chemical composition of viruses. Antigenic structure of virions.
19. The main stages of reproduction (multiplication) of viruses and their characteristics.
20. Reproduction of viruses.
21. Biological drugs used for the treatment, prevention and diagnosis of viral diseases (examples).
22. Immunity, types of immunity. Sterile and non-sterile immunity. Virus carriage.
23. Antiviral immunity and its features.
24. Resistance of viruses to physical and chemical factors, preservation of viruses. Inactivation of viruses, complete and partial (examples).
25. The role of antibodies and phagocytosis in antiviral immunity.
26. Characteristics of the main properties of viruses.
27. The role of the virus, macroorganism and environmental conditions in viral infection. process.
28. Structure and classification of viruses.
29. Specific factors of immunity in viral diseases and their role in protecting the body. Scheme of immunogenesis.
30. Chemical composition and antigenic structure of viruses.
31. Nonspecific factors of the body's defense and their role in antiviral immunity.
32. Essence, technique and accounting of hemagglutination reaction (HRA). Reaction controls.
33. The essence, technique of staging and accounting for the indirect (passive) hemagglutination reaction (IRHA, RPHA). Reaction controls.
34. The essence and technique of staging the diffusion precipitation reaction (DPR) (RDR). Accounting for reactions and controls.
35. The essence, technique of staging and taking into account the reaction of delay (inhibition) of hemagglutination (RDHA, HRTHA).
36. RSC in the diagnosis of viral diseases. Essence, technique of production and consideration of reaction.
37. Essence, technique of staging and taking into account the virus neutralization reaction (RN).

38. Virus neutralization reaction (RN) in the diagnosis of viral diseases - its essence, technique and recording.

GPC-4 Is able to use methods to solve problems, using modern equipment for the development of new technologies in professional activity and use modern professional methodology to conduct experimental research and interpret the results.

GPC-4 ID-1 To know: the technical capabilities of modern specialized equipment, methods of problems resolution in professional activity.

GPC-4 ID-2 To be able to: apply modern technologies and research methods in professional activities, interpret the results obtained.

GPC-4 ID-3 To possess skills of: the work with specialized equipment for implementation of the set tasks for research and the development of new technologies, digital ones, as well.

39. Methods of fluorescent antibodies (MFA). The essence and types of MFA.
40. Indirect methods of fluorescent antibodies (IFA), their essence and technique.
41. Microscopic method for studying pathological material in viral diseases. Staining of smears to detect inclusion bodies.
42. The concept of tissue culture (CT). Types of CT. Cytopathogenic effect of the virus on CT cells.
43. Structure of a chicken embryo (CE) - draw a diagram. Selection and preparation of EC for infection. Purpose of EC in virology (examples).
44. Laboratory animals used for the diagnosis of viral diseases. Selection and methods of infection (examples).
45. Features of collecting, transporting and preparing material for virological and serological studies.
46. Methods and sequence of laboratory diagnostics of pathological material for viral diseases (diagnostic scheme).
47. Primary trypsinized tissue cultures, methods of obtaining them.
48. The concept of the cytopathogenic effect (CPE) of the virus.
49. Serological diagnosis of viral diseases. Essence, types and purpose of serological reactions.
50. Features of the work of virology laboratories, equipment, safety precautions when working with viruses.
51. The concept of virus titer, titer units and virus titration technique.
52. Reaction of hemadsorption and delay of hemadsorption (RGAd, RZGAd). Essence, technique of production and consideration of reaction.
53. Luminescence microscopy in virology. Fluorochrome method (MF) and fluorescent antibody methods (MFA) - their essence and technique.
54. The concept of tissue cultures. Types of tissue cultures, principles of their preparation and purpose of tissue cultures in virology.
55. The use of chicken embryos in virology. Selection and preparation of embryos for infection. Methods for infecting embryos (Figure).
56. Methods for purification and concentration of viruses.

GPC-6 Is able to analyze, identify and assess the risk danger of the occurrence and spread of the disease.

GPC-6 ID-1 To know: existing programs for the prevention and control of zoonosis, contagious diseases, emergent or newly emerging infections, the use of animal identification systems, trace and control by the relevant veterinary services.

GPC-6 ID-2 To be able to: assess the risk of animal diseases, including the import of animals and animal products and other measures of veterinary services, the control of prohibited substances in the body of animals, animal products and feed.

GPC-6 ID-3 To possess skills to: conduct identification procedures, select and implement measures that can be used to reduce the risk level.

57. Animal parvoviruses. Characteristics of the Aleutian mink disease virus (plasmocytosis). Laboratory diagnosis of plasmacytosis.
58. Parvovirus enteritis of minks and dogs. Characteristics of viruses, laboratory diagnostic methods and means for specific prevention of the disease.
59. Taking pathological material and conducting laboratory diagnostics of foot and mouth disease.
60. Method of identification and typing of foot-and-mouth disease viruses. Laboratory diagnosis of foot and mouth disease. Biological preparations for the treatment and prof-ki of foot and mouth disease.
61. Biological preparations used for special purposes. prevention and treatment of swine fever.
62. Birdpox virus. Characteristics of the pathogen, laboratory diagnosis of the disease. Biological products for prevention.
63. African swine fever, differential diagnosis from classical plague. Characteristics of the African swine fever virus.
64. Leukosis of birds and cattle. Characteristics of pathogens and laboratory diagnostic methods.
65. Chicken laryngotracheitis (ILT), characteristics of the virus, laboratory diagnosis and specific prevention.
66. Causative agent of infectious anemia (INAN) of horses. Laboratory diagnostic methods and characteristics of the pathogen.
67. Differential diagnosis of rabies and Aujeszky's disease.
68. Differential diagnosis of plague and viral hepatitis of carnivores. Biological products for disease prevention.
69. Neurolymphomatosis of chickens (Marek's disease) - characteristics of the pathogen, laboratory diagnostics, means for specific prevention.
70. Parvovirus family, characteristics of properties. Parvovirus enteritis of dogs, minks and cats. Conducting laboratory diagnostics.
71. Avian infectious bronchitis virus, laboratory diagnostic methods and means for specific prevention of the disease.
72. Cattle rhinotracheitis (RT). Characteristics of the pathogen, laboratory diagnostic methods, specific prevention.
73. Biological preparations for specific prevention and treatment of rabies.

GPC-7. Is able to understand the principles of modern information technologies and use them to solve professional tasks.

GPC-7 ID-1 To know: modern technical means and information technologies.

GPC-7 ID-2 To be able to: use modern technical means and information technologies, including elements of machine learning and artificial intelligence to solve analytical and research problems.

GPC-7 ID-3 To possess skills to: use modern technical means and information technologies to solve analytical and research problems.

74. Characteristics of the canine distemper virus. Laboratory diagnostics and specific prevention of the disease.
75. Characteristics of animal influenza viruses. Methods for laboratory diagnosis of influenza and means for specific prevention of the disease.
76. Characteristics of the Aujeszky's disease virus. Conducting laboratory diagnostics and specific disease prevention.
77. Characteristics of the sheeppox virus. Means for specific prevention. Laboratory diagnosis of the disease.

78. Characteristics of Newcastle disease virus. Laboratory diagnostic methods and biological products for disease prevention.
79. Characteristics of the cattle plague virus, laboratory diagnostic methods and means for specific prevention.
80. Characteristics of porcine transmissible gastroenteritis virus. Laboratory diagnostic methods and means for specific prevention.
81. Characteristics of the classical swine fever virus. Taking pathological material and conducting laboratory diagnostics. Differentiation from African swine fever.
82. Characteristics of the rabies virus. Fixed virus and street virus. Works by L. Pasteur.
83. Characteristics of foot-and-mouth disease virus. The concept of the types and variants of foot-and-mouth disease virus. Methods for identifying and typing viruses. Biological products for treatment and prevention.
84. Characteristics of the carnivorous hepatitis virus, laboratory diagnosis of the disease. Means for specific prevention and treatment.
85. Characteristics of the malignant catarrhal fever virus Kr.rog.sk. Laboratory diagnostics and specific prevention.

4. METHODOLOGICAL MATERIALS DEFINING THE PROCEDURES FOR ASSESSING KNOWLEDGE, SKILLS AND ABILITIES AND WORK EXPERIENCE CHARACTERIZING THE STAGES OF COMPETENCE FORMATION

4.1. Criteria for evaluating students' knowledge during the knowledge survey (written survey)

Mark "**excellent"** - the student clearly expresses his point of view on the issues under consideration, giving appropriate examples.

Mark "**good**" - the student admits some errors in the answer

The mark «**satisfactory**" - the student discovers gaps in knowledge of the basic educational and normative material.

The mark "**unsatisfactory**" - the student discovers significant gaps in knowledge of the basic provisions of the discipline, the inability to obtain the correct solution to a specific practical problem with the help of a teacher.

4.2. Criteria for evaluating students' knowledge during testing

The test result is evaluated on a percentage rating scale. Each student is offered a set of test tasks of 25 questions:

The mark "**excellent**" is 25-22 correct answers.

The mark "**good**" is 21-18 correct answers.

The mark "**satisfactory**" is 17-13 correct answers.

The mark "**unsatisfactory**" is less than 13 correct answers

4.3. Criteria for evaluating students' knowledge in the preparation of reports

The mark "**excellent**" - the problem is identified and its relevance is justified; an analysis of various points of view on the problem under consideration is made and one's own position is logically stated; conclusions are formulated, the topic is fully disclosed, the volume is maintained; the requirements for external design are met, the basic requirements for the report are fulfilled.

The mark "**good**" - mistakes have been made. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the report

is not maintained; there are omissions in the design, there are significant deviations from the requirements for the presentation of materials.

The mark “**satisfactory**" - the topic is only partially covered; factual errors were made in the content of the report; there are no conclusions, the topic of the report is not disclosed.

The mark "**unsatisfactory**" - there is a significant misunderstanding of the problem or the report is not submitted.

1.4. Criteria for evaluating students' knowledge when checking control papers 1.5.

The mark "**excellent**" - the problem is identified and its relevance is justified; an analysis of various points of view on the problem under consideration is made and one's own position is logically stated; conclusions are formulated, the topic is fully disclosed, the volume is maintained; the requirements for external design are met, the basic requirements for the abstract are fulfilled

The mark is "**good**" - mistakes have been made. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the abstract is not maintained; there are omissions in the design, there are significant deviations from the requirements for abstracting.

The mark "**satisfactory**" - the topic is only partially covered; factual errors were made in the content of the abstract; there are no conclusions, the topic of the abstract is not disclosed

The mark "**unsatisfactory**" - there is a significant misunderstanding of the problem or the abstract is not presented at all.

4.5. Criteria of knowledge during the test

The mark "**accepted** " must correspond to the parameters of any of the positive ratings ("excellent", "good", "satisfactory").

The mark "**not accepted** " rating should correspond to the parameters of the "unsatisfactory" rating.

The mark "excellent" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in situations of increased complexity. At the same time, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations may be allowed.

The mark "good" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in standard situations. At the same time, minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations may be made.

Mark "satisfactory" – one or more types of educational work provided for in the curriculum have not been completed. The student demonstrates incomplete compliance of knowledge, skills, and abilities with the indicators given in the tables, significant errors are made, a partial lack of knowledge, skills, and skills is manifested in a number of indicators, the student experiences significant difficulties in operating with knowledge and skills when transferring them to new situations. –

The mark «unsatisfactory" – the types of educational work provided for in the curriculum have not been completed. demonstrates incomplete compliance of knowledge, skills, and abilities given in the tables of indicators, significant errors are made, a lack of knowledge, skills, and skills is manifested for a large number of indicators, the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations

4.6. Criteria of knowledge during the examination

The mark "excellent" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in various situations of increased complexity. At the same time, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations may be allowed. –

The mark "good" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in standard situations. At the same time, minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations can be made.

Mark "satisfactory" – one or more types of educational work provided for in the curriculum have not been completed. The student demonstrates incomplete compliance of knowledge, skills, and abilities with the indicators given in the tables, significant errors are made, a partial lack of knowledge, skills, and skills are manifested in a number of indicators, the student experiences significant difficulties in operating with knowledge and skills when transferring them to new situations.

The mark "unsatisfactory" – the types of educational work provided for in the curriculum have not been completed. demonstrate incomplete compliance of knowledge, skills, and abilities given in the tables of indicators, significant errors are made, a lack of knowledge, skills, and skills are manifested for a large number of indicators, the student experiences significant difficulties in operating with knowledge and skills when transferring them to new situations.

5. ACCESSIBILITY AND QUALITY OF EDUCATION FOR DISABLED PEOPLE

If necessary, persons with disabilities and persons with disabilities are given additional, time to prepare an answer for the test.
When conducting the procedure for evaluating the learning outcomes of disabled people and persons with disabilities, their own technical means can be used.

The procedure for evaluating the learning outcomes of disabled people and persons with disabilities in the discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For people with visual impairments:	– in printed form in enlarged font; – in the form of an electronic document.
For people with hearing impairments:	– in printed form; – in the form of an electronic document.
For people with disorders of the musculoskeletal system:	– in printed form, the device; – in the form of an electronic document.

When conducting the procedure for evaluating the learning outcomes of disabled people and persons with disabilities in the discipline, it ensures that the following additional requirements are met, depending on the individual characteristics of the students:

a) instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing);

b) an accessible form of assignment of assessment tools (in printed form, in printed form in enlarged font, in the form of an electronic document, assignments are read out by the teacher);

c) an accessible form of providing answers to tasks (written on paper, a set of answers on a computer, orally).

If necessary, for students with disabilities and the disabled, the procedure for evaluating the results of training in the discipline can be carried out in several stages.

The procedure for evaluating the learning outcomes of disabled people and persons with disabilities is allowed using distant learning technologies.