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Информация о владельце:  
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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION  
Federal State Autonomous Educational Institution of Higher Education  
NORTH CAUCASIAN FEDERAL UNIVERSITY

**I APPROVED BY**

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**WORKING PROGRAM DISCIPLINES (MODULE)**  
**Advanced Mathematics**

|                                 |                                                                       |
|---------------------------------|-----------------------------------------------------------------------|
| Field of study/specialty        | 11.03.02 Infocommunication technologies and communication systems     |
| Profile/specialization          | Intelligent Data Processing in Infocommunication Systems and Networks |
| Year of commencement of studies | 2026                                                                  |
| Form of study                   | full-time                                                             |
| Implemented in a semester       | 1                                                                     |

**Developed by**

Associate Professor of the Department of  
Mathematical Modeling of the Faculty of  
Mathematics and Computer Science named  
after Professor N.I. Chervyakov  
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### 1. The purpose and objectives of mastering the discipline (module)

The purpose of mastering the discipline is the formation of general professional competencies of a bachelor in the direction 11.03.02 Infocommunication technologies and communication systems, by studying the basics of higher mathematics.

*Objectives of mastering the discipline :*

- to introduce students to the fundamentals of the theory of functions of a real variable, the basic concepts and methods of the theory of limits and series, differential and integral calculus of functions of one and several variables;
- to develop the ability to solve typical problems in the main sections of the course; • to demonstrate the universal nature of the basic concepts of mathematical analysis in the use of mathematical methods necessary for solving problems of professional activity.

### 2. The place of the discipline (module) in the structure of the educational program

The course “Higher Mathematics/Advanced Mathematics” belongs to block 1 “Disciplines (modules)” (compulsory part).

### 3. List of planned learning outcomes for the discipline (module), correlated with the planned learning outcomes for the educational program

| Code, formulation of competence                                                                                                                                                                | Code, indicator formulation                                                                                                                              | Planned learning outcomes for the discipline (module), characterizing the stages of formation of competencies, indicators |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| OPK-1. Capable of applying natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities. | ID-1 OPK-1 understands the basics of higher mathematics, physics, the basics of computer technology and programming.                                     | Applies fundamental knowledge gained in the field of mathematical sciences and uses it in professional activities         |
|                                                                                                                                                                                                | ID-2 OPK-1 solves standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling. | Willingness to apply and modify mathematical models to solve problems in the field of professional activity               |
|                                                                                                                                                                                                | ID-3 OPK-1 carries out theoretical and experimental research of objects of professional activity.                                                        | Willingness to use mathematical methods necessary to solve problems in professional activities                            |

### 4. Volume of the academic discipline (module) and forms of control \*

|                                                           |                           |
|-----------------------------------------------------------|---------------------------|
| Amount of classes: total: 10 credits, 360 academic hours. | OFO,<br>in academic hours |
| <b>Contact work:</b>                                      |                           |

|                                                 |     |
|-------------------------------------------------|-----|
| Lectures/including practical training           | 50  |
| Laboratory work /including practical training   | 0   |
| Practical classes /including practical training | 176 |
| <b>Independent work</b>                         | 130 |
| <b>Forms of control</b>                         |     |
| Exam                                            | 54  |
| Credit                                          | -   |
| Credit with grade                               | -   |
| Coursework                                      | No  |

The discipline (module) provides for the use of e-learning and distance learning technologies (*unless otherwise established by the educational standard*).

**5. The content of the discipline, structured by topics (sections) indicating the number of hours and types of classes**

| No. | Section (topic) of the discipline and brief content                                                                                                                                                                                                                                                                                                                                                                                                      | Developed competencies, indicators                  | full-time education                                                                       |                   |                 | Independent work, hours | Forms of the current control academic performance |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------|-----------------|-------------------------|---------------------------------------------------|
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                     | Contact work of students with a teacher/of which in the form of practical training, hours |                   |                 |                         |                                                   |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                     | Lectures                                                                                  | Practical classes | Laboratory work |                         |                                                   |
| 1   | <b>Function of a real variable</b><br>1. The concept of a set, operations on sets. Numerical sets. Neighborhood of a point.<br>2. Absolute value of a real number, its basic properties. 3. The concept of a function. Basic properties of functions. 4. Basic elementary functions, their properties and graphs.<br><i>Lesson 1. Sets. Method of Mathematical Induction. Bernoulli's Inequality</i><br><i>Lesson No. 2. Function of a real variable</i> | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |                                                                                           | 8                 |                 | 4                       | Solving practical problems                        |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     |  |   |  |   |                            |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--|---|--|---|----------------------------|
| 2 | <b>Limit of a numerical sequence</b><br>1. Numerical sequences and their basic properties<br>2. The limit of a sequence and its geometric interpretation 3. Basic theorems on limits 4. Calculating limits of numerical sequences. The number $e$ and natural logarithms<br><i>Lesson #3. Calculating the limit of a sequence</i><br><i>Lesson No. 4. Calculating the limit of a function</i>                                                                                                                                                                                                                                                                                                                                                                      | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 3 | <b>Limit of a function</b><br>1. The limit of a function at a point and its properties<br>2. One-sided limits of a function at a point. Calculating the limit of a function at a point 3. Infinitesimal and infinitely large quantities and their properties 4. The first remarkable limit and its main consequences. The second remarkable limit<br><i>Lesson #5: Remarkable Limits</i>                                                                                                                                                                                                                                                                                                                                                                           | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 4 | <b>Continuity of function</b><br>1. The concept of continuity of a function<br>2. Points of discontinuity of a function and their classification<br>3. Properties of functions continuous at a point<br>4. Properties of functions continuous on a segment<br><i>Lesson No. 6. Continuity of function</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 5 | <b>Derivative of a function and differential</b><br>1. Definition of the derivative, its geometric and mechanical meaning.<br>2. Basic rules of differentiation. Derivative of a composite function. 3. Formulas for differentiation of basic elementary functions (table of derivatives). 4. Differentiation of implicit functions and functions specified parametrically. 5. Differential of a function, its geometric meaning and properties. 6. Derivatives and differentials of higher orders.<br><i>Lesson No. 7. Calculating the derivative by definition</i><br><i>Lesson No. 8. Technique for finding derivatives</i><br><i>Lesson No. 9. Differentiation of complex functions</i><br><i>Lesson No. 10. Fundamental theorems of differential calculus</i> | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                     |  |   |  |   |                            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--|---|--|---|----------------------------|
| 6  | <b>Using the derivative to study a function</b><br>1. L'Hôpital's rule for disclosing uncertainties<br>2. Signs of increasing and decreasing functions. Extremum of a function<br>3. Convexity, concavity, and inflection points of a function graph<br>4. Asymptotes of a function graph<br>5. Study of a function and construction of its graph<br><i>Lesson No. 11. Using the derivative to study a function</i>                                                                                                                                                                                            | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 7  | <b>Functions of several variables</b><br>1. Functions of two and several variables. Domain of a function.<br>2. Level lines and surfaces.<br>3. Limit of the Federal Tax Service<br>4. Continuity of the FNP.<br><i>Lesson #12. Complete study of the function and plotting the graph</i><br><i>Lesson #23. Functions of Several Variables. Basic Concepts, Domain</i><br><i>Lesson No. 24. Partial derivatives of a function of several variables</i><br><i>Lesson No. 25. Total differential of a function of several variables</i>                                                                          | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 9  | <b>Differential calculus of functions of several variables</b><br>1. Functions of two and several variables. Domain of definition of a function.<br>2. First-order partial derivatives of a function of several variables.<br>3. Higher-order partial derivatives of a function of several variables.<br>4. First-order differential of functions of several variables, invariance property.<br>5. Higher-order differentials of functions of several variables.<br><i>Lesson No. 26. Partial derivatives and differentials of higher orders</i><br><i>Lesson No. 27. Differentiation of complex functions</i> | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |
| 10 | <b>Indefinite integral and its properties</b><br>1. Antiderivative function and indefinite integral<br>2. Basic properties of the indefinite integral<br>3. Table of basic integrals.<br>Direct integration<br><i>Lesson No. 28. Extremum of a function of several variables</i>                                                                                                                                                                                                                                                                                                                               | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8 |  | 6 | Solving practical problems |

|    |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                     |  |   |  |   |                            |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--|---|--|---|----------------------------|
| 11 | <b>Basic integration methods</b><br>1. Change of variable (substitution) in an indefinite integral<br>2. Integration by parts 3. Integration of some rational expressions<br><i>Lesson No. 29. The greatest and least value of a function of several variables</i>                                                                                                                                    | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |
| 12 | <b>Definite integral and its properties.</b><br>1. The concept of a definite integral.<br>2. The geometric, physical, and economic meaning of a definite integral.<br>3. The main properties of a definite integral. 4. The relationship between a definite integral and an indefinite integral, the Newton-Leibniz formula.<br><i>Lesson #30. Calculating double integrals by double integration</i> | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |
| 13 | <b>Methods for calculating a definite integral</b><br>1. Direct integration method<br>2. Change of variable in a definite integral 3. Integration by parts in a definite integral<br><i>Lesson #31. Calculating a Double Integral in Cartesian Coordinates</i>                                                                                                                                        | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |
| 14 | <b>Geometric applications of the definite integral. Improper integrals</b><br>1. Calculating the areas of plane figures<br>2. Calculating the volumes of solids of revolution 3. Improper integrals with infinite limits of integration (first kind)<br>4. Improper integrals of unbounded functions (second kind)<br><i>Lesson No. 32. Transition to polar coordinates in double integrals</i>       | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |
| 15 | <b>First order differential equations.</b><br>1. Basic concepts of differential equations.<br>2. First-order differential equation : Cauchy problem, general and particular solution.<br>3. Equations with separable variables.<br>4. Homogeneous equations.<br><i>Lesson #34. Calculating a Triple Integral in Cartesian Coordinates</i>                                                             | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |
| 16 | <b>Linear and homogeneous equations of the first order</b><br>1. Linear equations of the first order.<br>2. Bernoulli equations. 3. Homogeneous equations<br><i>Lesson #35. Calculating a Triple Integral in Cylindrical Coordinates</i>                                                                                                                                                              | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK- 1 |  | 8 |  | 6 | Solving practical problems |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     |  |     |  |     |                            |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--|-----|--|-----|----------------------------|
| 17 | <b>Differential equations of higher orders.</b><br>1. Differential equations of higher orders. Basic concepts.<br>2. Reducing the order of an equation that does not contain the desired function.<br>3. Reducing the order of an equation that does not contain an independent variable.<br><i>Lesson #36. Calculating a Triple Integral in Spherical Coordinates</i>                                          | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
| 18 | <b>Linear differential equations of the second order with constant coefficients</b><br>1. Integration of second-order LNDE with constant coefficients.<br>2. Structure of the general solution of LNDE. 3. Selection of a particular solution of a linear inhomogeneous equation with a right-hand side of a special type.<br><i>Lesson No. 37. Geometric applications of triple integrals</i>                  | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
| 19 | <b>Series with positive terms</b><br>1. Basic concepts of numerical series. Properties of convergent series.<br>2. Necessary criterion for convergence of numerical series. Harmonic series. 3. Criteria for comparison of positive series. 4. D'Alembert's criterion. Cauchy's radical and integral criteria.<br><i>Lesson No. 40. Radical and integral Cauchy tests for convergence of a numerical series</i> | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
| 20 | <b>Functional and power series</b><br>1. Alternating series. Leibniz's theorem. 2. General sufficient condition for convergence of an alternating series. 3. Absolutely and conditionally convergent series. Properties of absolutely convergent series.<br><i>Lesson #41. Alternating Series. Leibniz's Test</i>                                                                                               | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
| 21 | <b>Expansions of functions into power series</b><br>1. Taylor and Maclaurin series.<br>2. Expansion of elementary functions into Maclaurin series.<br><i>Lesson No. 42. Study of convergence of functional series</i>                                                                                                                                                                                           | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
| 22 | <b>Some applications of power series.</b><br><i>Lesson No. 43. Study of convergence of power series</i>                                                                                                                                                                                                                                                                                                         | OPK -1<br>ID-1 OPK- 1<br>ID-2 OPK- 1<br>ID-3 OPK -1 |  | 8   |  | 6   | Solving practical problems |
|    | <b>TOTAL for 1 semester</b>                                                                                                                                                                                                                                                                                                                                                                                     |                                                     |  | 176 |  | 130 |                            |

|  |       |  |  |     |  |     |  |
|--|-------|--|--|-----|--|-----|--|
|  | EXAM  |  |  |     |  | 54  |  |
|  | TOTAL |  |  | 176 |  | 184 |  |

## **6. Fund of assessment tools for conducting ongoing monitoring of academic performance and midterm assessment of students in a discipline (module)**

The assessment toolkit (AST) for a course (module) is based on a list of mastered competencies with associated indicators. The AST provides objective monitoring of the achievement of planned learning outcomes. The AST includes:

- description of indicators and criteria for assessing competencies at various stages of their formation, description of assessment scales;
- methodological materials that define the procedures for assessing knowledge, skills, abilities and (or) work experience that characterize the stages of competencies formation (included in the methodological guidelines for those types of work that are provided for by the curriculum and provide for the assessment of the development of competencies);
- standard assessment tools necessary for assessing knowledge, skills and the level of development of competencies.

FOS is an appendix to this discipline (module) program.

## **7. Methodological guidelines for students on mastering the discipline**

When starting work, each student should take into account the following provisions.

The discipline (module) is structured on a thematic principle, each topic is a logically complete section.

The lecture material is devoted to the examination of key, basic provisions of the courses and an explanation of the educational assignments assigned to students for independent work.

Practical classes are held with the aim of consolidating the acquired information and acquiring skills for its application in solving practical problems in the relevant subject area.

Students' independent work is aimed at independent study of additional material, preparation for practical and laboratory classes, and completion of all types of independent work.

To successfully master the course, it is necessary to complete all types of independent work using the recommended sources of information.

## **8. Educational, methodological and informational support of the discipline**

### **8.1. List of basic and additional literature required for mastering the discipline (module)**

#### **8.1.1. List of main literature:**

1. Boronina, E. B. Mathematical Analysis. Electronic resource: Study guide / E. B. Boronina. - Mathematical Analysis, 2020-02-05. - Saratov: Nauchnaya kniga, 2019. - 159 p. - The book is in the premium version of the IPR BOOKS electronic library system. - ISBN 978-5-9758-1745-7, unlimited copies
2. Trukhan, A. A. Mathematical analysis. Function of one variable. Electronic resource / Trukhan A. A.: a textbook for universities. - St. Petersburg: Lan, 2020. - 324 p. - ISBN 978-5-8114-5936-0, unlimited copies
3. Igonina, T. R. Functions of several variables. Mathematical analysis. Electronic resource / Igonina T. R.: a teaching aid. - Moscow: RTU MIREA, 2020. - 97 p., unlimited copies

#### **8.1.2. List of additional literature:**

1. Nurmagomedov, A. A. Mathematical analysis. Lecture course. Electronic resource / Nurmagomedov A. A.: lecture course. - Makhachkala: DagSAU named after M.M. Dzhambulatov, 2020. - 95 p., unlimited copies

2. Beletskaya, N. V. Mathematical analysis. Test assignments Electronic resource / Beletskaya N. V., Dragileva I. P., Zaitsev A. B. - Moscow: RTU MIREA, 2020. - 36 p., unlimited copies

8.2. List of educational and methodological support for independent work of students in a discipline (module)

1. Mathematical analysis: a tutorial (workshop): training direction 01.03.02 Applied Mathematics and Computer Science; training profile Mathematical modeling and computational mathematics. Bachelor's degree / compiled by E. P. Yartseva; FGAOU VO North-Caucasian Federal University. - Stavropol: SKFU, 2018. - 339 p.

2. Roshchenko, O. E. Mathematical analysis. Differential and integral calculus of functions of several variables. Differential equations: a tutorial / O. E. Roshchenko, E. A. Lebedeva. - Mathematical analysis. Differential and integral calculus of functions of several variables. Differential equations, 2025-09-07. - Electronic data (1 file). - Novosibirsk: Novosibirsk State Technical University, 2019. - 76 p. - electronic. - The book is in the premium version of the IPR BOOKS electronic library system. - ISBN 978-5-7782-3944-9, unlimited copies

8.3. List of resources of the information and telecommunications network "Internet" required for mastering the discipline (module)

<http://www.mathprofi.ru/> Mathematics to help students (Higher mathematics – simple and accessible).

<http://www.exponenta.ru/> Educational mathematics site.

<http://www.math24.ru/> The site contains a large number of problems with detailed solutions on mathematical analysis and ordinary differential equations.

**9. List of information technologies used in the implementation of the educational process in the discipline (module), including a list of software and information reference systems**

Lectures are delivered using computers and multimedia presentations. During seminars and practical classes, students present presentations they prepared during their independent work hours.

Information reference systems:

Information and reference and information and legal systems used in the study of the discipline:

Software:

- 1 Alt Workstation 10
- 2 Alt Workstation K
- 3 Alt "Server"
- 4 Office suite - P7-Office

**10. Description of the material and technical base necessary for the implementation of the educational process in the discipline (module)**

|                    |                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lecture classes    | A classroom for conducting classes, equipped with multimedia equipment and technical teaching aids.                                                                                       |
| Practical classes  | A classroom for conducting classes, equipped with multimedia equipment and technical teaching aids.                                                                                       |
| Independent work   | A room for independent student work equipped with computers and the ability to connect to the Internet and access the university's electronic information and educational environment.    |
| Practical training | It is carried out in the structural divisions of the university and (or) in organizations operating in the profile of the relevant educational program, including its structural division |

## **11. Features of mastering the discipline (module) by persons with disabilities**

Students with disabilities are provided with special textbooks, teaching aids and didactic materials, special technical teaching aids for collective and individual use, the services of an assistant (helper) who provides students with the necessary technical assistance, as well as the services of sign language interpreters and tactile sign language interpreters.

The acquisition of a discipline (module) by students with disabilities can be organized jointly with other students, as well as in separate groups.

The acquisition of a discipline (module) by students with disabilities is carried out taking into account the characteristics of psychophysical development, individual capabilities and health status.

In order to ensure accessibility of higher education under the educational program for individuals with disabilities, the following is provided when mastering a discipline (module):

1) for persons with visual impairments:

- the presence of an assistant who provides the student with the necessary technical assistance, taking into account individual characteristics (helps to take up a workstation, move around, read and complete assignments, including taking down dictation),
- written assignments, as well as instructions on how to complete them, are written in large print,
- special textbooks, teaching aids and didactic materials (with large print or audio files),
- individual uniform illumination of at least 300 lux,
- if necessary, the student is provided with a magnifying device to complete the assignment;

2) for persons with hearing impairments:

- the presence of an assistant who provides the student with the necessary technical assistance, taking into account individual characteristics (helps to take up a workstation, move around, read and complete assignments, including taking down dictation),
- the availability of sound amplification equipment for collective use is ensured; if necessary, the student is provided with sound amplification equipment for individual use;
- is provided with appropriate sound means for reproducing information;

3) for persons with disabilities who have musculoskeletal disorders (including severe impairments of the motor functions of the upper limbs or the absence of upper limbs):

- written assignments are completed on a computer with specialized software or dictated to an assistant;
- at the student's request, assignments can be completed orally.

## **12. Features of the implementation of the discipline using distance learning technologies and e-learning**

According to Part 1 of Article 16 of Federal Law No. 273-FZ of December 29, 2012, "On Education in the Russian Federation," *e-learning* is defined as the organization of educational activities using information contained in databases and used in the implementation of educational programs, as well as information technologies, technical means, and information and telecommunications networks that facilitate the transmission of said information over communication lines, as well as interaction between students and teaching staff. *Distance learning technologies* are educational technologies implemented primarily using information and telecommunications networks through indirect (remote) interaction between students and teaching staff.

The course may be delivered using distance learning technologies and e-learning, in whole or in part. The components of the course's teaching and methodological kit (the course curriculum, assessment and methodological materials, and assessment forms) implemented using distance learning technologies and e-learning contain instructions for their use.

When organizing educational activities using distance learning technologies and e-learning, asynchronous and synchronous methods of interaction between participants in educational relations may be provided through the Internet information and telecommunications network.

When using distance learning technologies and e-learning, the curriculum for the discipline shall indicate: methods of interaction between participants in educational relations via the Internet (videoconferencing, electronic testing); links to the SKFU electronic information and educational environment, to educational platforms and resources of other organizations that are openly accessible via the Internet; for synchronous learning - the time of online classes and teachers; for asynchronous learning - the authors of online courses.

When organizing midterm assessments using distance learning technologies and e-learning, the Methodological Recommendations for the Application of Technical Means Ensuring the Objectivity of Results during Midterm and State Final Assessments for Higher Education Programs—Bachelor's Degree Programs, Specialist Programs, and Master's Degree Programs Using Distance Learning Technologies—are used (Letter of the Ministry of Education and Science of the Russian Federation dated December 7, 2020, No. MN-19/1573-AN "On the Submission of Methodological Recommendations").

The implementation of the course using e-learning and distance learning technologies is carried out using the electronic information and educational environment of SKFU, to which students have access via the information and telecommunications network "Internet", or using the resources of other organizations, including platforms that provide services for video conferencing, online meetings and distance learning, as well as using the capabilities of social networks for communication between students and teachers.

The educational and methodological support for a discipline implemented using e-learning and distance learning technologies includes a work program, educational and methodological manuals or a course of lectures, methodological instructions for the implementation of various types of educational activities of students provided for by the discipline, and other educational and methodological materials posted in the information and educational environment of SKFU, presented in electronic form.