

Документ подписан простой электронной подписью

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

Acting director of the institute
advanced engineering

Ph.D. tech. Sciences, Associate Professor
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WORKING PROGRAM OF THE DISCIPLINE
« Development programs in Python/Python Program Design »

Direction of training	11.03.02 Infocommunication technologies and communication systems
Profile	Intelligent Data Processing in Infocommunication Systems and Networks
Year of commencement of studies	2026
Form of study	full-time
Implemented in a semester	4

Developed by

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1. The purpose and objectives of mastering the discipline (module)

The goal of mastering the course: "Development of programs in Python" is to develop a set of competencies in programming on various platforms.

Objectives of mastering the course: to study programming in modern information systems environments: creation of modular programs, elements of the theory of modular programming, to study the features of the formation of visual interfaces for various types of operating systems

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

The course "Developing Python Programs" is a required course in Block 1 of the Discipline (modules). It is completed in the third semester.

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-4. Able to understand the operating principles of modern information technologies and use them to solve professional problems.	ID-1 OPK-4 uses information and communication technologies to search for the necessary information.	uses information and communication technologies when searching for the necessary information.
	ID-2 OPK-4 designs a solution to a specific project problem, selecting the optimal solution based on current legal regulations and available resources and constraints.	designs a solution to a specific project problem, choosing the optimal way to solve it, based on current legal regulations and available resources and constraints.
	ID-3 OPK-4 understands modern interactive software packages and basic methods of processing experimental data, including the use of standard software, general-purpose and special-purpose software packages.	understands modern interactive software systems and basic techniques for processing experimental data, including the use of standard software, general-purpose and special-purpose software packages.
	ID-4 OPK-4 uses the capabilities of computing technology and software to solve problems of control and algorithmization of information processing processes.	uses the capabilities of computing technology and software to create applications, uses the Python language to solve information processing problems

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

Amount of classes: total: 3 credits, 108 academic hours.	OFO, In academic hours
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Contact work:	
Lectures/including practical training	-
Laboratory work /including practical training	-
Practical classes /including practical training	24
Independent work	84
Forms of control	-
Exam	-
Credit	Yes
Credit with grade	-
Coursework	No

5. The content of the discipline (module), 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				Forms of the current control academic performance
			Contact work of students with a teacher/of which in the form of practical training, hours			Independent work, hours	
			Lectures	Laboratory work	Practical classes		
4th semester							
1	Introduction to Python programming. Linear programs. Branching computational processes. Looping. Linear programs. Branching computing processes. Organization of cycles. Practical Work #1: "Linear Programs" Practical work #2: "Branching computing processes" Practical work No. 3: "Organization of cycles".	About PC-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4			6	10	interview
2	Functional programming in Python. Recursion. Functional programming in Python. Recursion.	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4				10	interview
3	Arrays. Sorting. Working with strings. Matrices. Arrays. Sorting. Working with strings. Matrices.	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4			6	10	interview

	Practical Work #4: "One-Dimensional Arrays" Practical Work #5: "Two-Dimensional Arrays and Functions"						
4	Working with files. Organizing the computing process. Working with structures and dictionaries. Working with files. Organization of the computing process. Working with structures and dictionaries. Practical Work #6: "Files"	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4			6	10	interview
5	Working with stacks. Trees. Graphs. Working with the stack. Trees. Counts.	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4				10	interview
6	Dynamic programming. Object-oriented programming in Python. Encapsulation, polymorphism, inheritance. Dynamic programming. Object-oriented programming in Python. Encapsulation, polymorphism, inheritance.	About PC-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4				10	interview
7	Introduction to graphics in Python. Graphics programming. Introduction to Graphics in Python. Graphics programming. Practical Work #7: "Graphics Programming." Turtle Module Practical Work #8: "GUI, Tkinter Module"	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4			6	10	interview
8	Working with Widgets. Model and View in Python. Working with widgets. Model and view in Python.	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4				10	interview
9	Selected Algorithms in Python. Dijkstra's algorithm. Queen placement problem. Fibonacci numbers. The knapsack problem.	OPK-4 ID-1 OPK-4 ID-2 OPK-4 ID-3 OPK-4 ID-4 OPK-4				4	interview

	TOTAL for 3rd semester				24	84	
	TOTAL				24	84	

6. Fund of assessment tools for the discipline (module)

The Assessment Toolkit (AT) for ongoing performance monitoring and midterm assessment of students in the course (module) "Python Program Development" is based on a list of mastered competencies, indicating the stages of their development during the course (module) mastery. The AT provides objective monitoring of the achievement of planned learning outcomes. The AT includes:

- description of indicators and criteria for assessing competencies at various stages of their formation, description of assessment scales;
 - methodological materials defining the procedures for assessing knowledge, skills, abilities and (or) work experience, characterizing the stages of competence development;
 - standard test assignments and other materials necessary for assessing knowledge, skills and the level of mastery of the developed competencies in the process of mastering the discipline (module).
- 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 work is carried out 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. Baldzhi, A. S.; Mathematics in Python: a tutorial / A.S. Baldzhi, M.B. Khripunova, I.A. Aleksandrova; Financial University under the Government of the Russian Federation, 1, Elements of linear algebra and analytic geometry. - Moscow: Prometheus, 2018. - 76 p.: table. - <http://biblioclub.ru/>. - Bibliography in the book. - ISBN 978-5-907003-86-6

2. Borzunov, S. V.; Algebra and Geometry with Examples in Python Electronic resource / Borzunov S. V., Kurgalin S. D.: a textbook for universities. - St. Petersburg: Lan, 2020. - 444 p. - ISBN 978-5-8114-5489-1

3. Shkaberina, G. Sh.; Programming. Basics of the Python Language Electronic resource / Shkaberina G. Sh., Rezova N. L.: study guide. - Krasnoyarsk: Siberian State University named after Academician M. F. Reshetnev, 2018. - 92 p. - APPROVED BY the Editorial and Publishing Council of the University as a study guide for undergraduate students in the areas of training 09.03.01 "Computer Science and Computer Engineering", 09.03.02 "Information Systems and Technology", 09.03.04 "Software Engineering" of all forms of education

8.1.2. List of additional literature:

1. Suzi, R.A.; The Python Programming Language. Electronic resource: a tutorial / R.A. Suzi. - The Python Programming Language, 2020-07-28. - Moscow: Internet University of Information Technologies (INTUIT), 2016. - 350 p. - The book is in the basic version of the IPRbooks electronic library system. - ISBN 5-9556-0058-2

2. Sheludko, V. M.; Fundamentals of Programming in the High-Level Language Python Electronic resource: Textbook / V. M. Sheludko. - Rostov-on-Don, Taganrog: Publishing House of the Southern Federal University, 2017. - 146 p. - The book is in the premium version of the IPR BOOKS electronic library system. - ISBN 978-5-9275-2649-9

3. Sheludko, V. M.; The High-Level Programming Language Python. Functions, Data Structures, Additional Modules Electronic resource: Textbook / V. M. Sheludko. - Rostov-on-Don, Taganrog: Publishing House of the Southern Federal University, 2017. - 107 p. - The book is in the premium version of the IPR BOOKS electronic library system. - ISBN 978-5-9275-2648-2

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

1. Baldzhi, A. S.; Mathematics in Python: a tutorial / A.S. Baldzhi, M.B. Khripunova, I.A. Aleksandrova; Financial University under the Government of the Russian Federation, 1, Elements of linear algebra and analytic geometry. - Moscow: Prometheus, 2018. - 76 p.: table. - <http://biblioclub.ru/>. - Bibliography in the book. - ISBN 978-5-907003-86-6

2. Voronkin R. A., Fundamentals of Software Engineering. Laboratory Workshop

3. Suzi, R.A.; The Python Programming Language. Electronic resource: a tutorial / R.A. Suzi. - The Python Programming Language, 2020-07-28. - Moscow: Internet University of Information Technologies (INTUIT), 2016. - 350 p. - The book is in the basic version of the IPRbooks electronic library system. - ISBN 5-9556-0058-2

4. Sheludko, V. M.; Fundamentals of programming in the high-level language Python: a tutorial / V. M. Sheludko. - Rostov-on-Don | Taganrog: Publishing house of the Southern Federal University, 2017. - 147 p. : ill. - <http://biblioclub.ru/>. - Bibliography in the book. - ISBN 978-5-9275-2649-9

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

1. Electronic Library System "University Library NLINE" <http://biblioclub.ru>.
2. EBS "IPRbooks" <http://www.iprbookshop.ru>
3. Electronic catalog of SKFU.

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 utilize computer technology to present multimedia presentations. During laboratory work, students conduct research on models of physical processes and the devices that implement them using computer modeling software and industrial laboratory equipment.

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.

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 providing services for video conferencing, online meetings and distance learning (MTS-Link), 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.