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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"NORTH CAUCASUS FEDERAL UNIVERSITY"

APPROVED BY

Acting Director of the Institute
Advanced Engineering
A.A. Porokhnya

**WORK PROGRAM OF THE DISCIPLINE
"Object-Oriented Programming"**

Field of study	11.03.02 Infocommunication Technologies and Communication Systems
Profile	Intelligent Data Processing in Infocommunication Systems and Networks
Year of start of training	2026
Form of study	Full-time
Implemented in a semester	3

Developed by

Associate Professor at the School of
Digital Education,
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Stavropol, 2026

1. Purpose and objectives of mastering the discipline (module)

Purpose of mastering the discipline: The purpose of the discipline "Object-Oriented Programming"

- theoretical and practical training that provides knowledge of the basics of object-oriented programming;
- obtaining practical skills in the development of object-oriented programs;
- acquisition of skills in the use of standard techniques in the compilation and debugging of object-oriented programs on personal computers;
- obtaining skills in using an object-oriented approach to solving

Objectives of the discipline:

- training of a specialist who is confident in the opportunities provided by the modern computer technologies;
- teaching students object-oriented programming;
- formation of programming skills using object-oriented technologies;
- teaching students to work in a programming environment

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

The discipline refers to the part formed by the participants of educational relations. Its development takes place in 5 semesters.

3. List of planned learning outcomes in the discipline (module) correlated with the planned results of the development of the educational program

Code, formulation of competence	Indicator code, wording	Planned learning outcomes in the discipline (module), characterizing the stages of the formation of competencies, indicators
OPK-3. Able to apply methods of search, storage, processing, analysis and presentation of information from various sources and databases in the required format, while observing the basic requirements of information security	ID-3 _{OPK-3} solves data processing problems using computer technology.	solves the problem of data processing using computer technology using the Python language
OPK-4. Able to understand the principles of modern information technologies and use them to solve problems of professional activity	ID-4 _{OPK-4} uses the capabilities of computer technology and software to solve problems of control and algorithmization of information processing processes.	uses the capabilities of computing and software to create applications, uses the Python language to solve information processing problems
OPK-5. Able to develop algorithms and computer programs suitable for practical application	ID-2 _{OPK-5} reads the codes of software products written in the mastered programming languages and makes the necessary changes	reads codes, understands and makes required changes to the program code

	ID-3 OPK-5 develops original algorithms and computer programs suitable for practical use	develops original applications suitable for practical use
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4. Scope of the academic discipline (module) and forms of control

Scope of classes: total: <u>3</u> EC, <u>108</u> academic hours.	OFO, in acad. hours
Contact work:	
Lectures/from them practical training	-
Laboratory work/from them practical training	-
Practical training/of which practical training	24
Independent work	30
Forms of control	
Exam	54
Credit	-
Credit with a grade	-
Term papers	no

5. The content of the discipline (module), structured by topics (sections) with an indication of the number of hours and types of classes

5.1. Thematic plan of the discipline (module)

№	Section (topic) of the discipline and summary	Emerging competencies, indicators	Contact work of students with the teacher / of them in the form of practical training, hours				Independent work, hours	Current Forms control Academic Performance
			Lectures	Laboratory work	Practical exercises	Group Counseling		
Semester 3								
1	The concept and features of the object-oriented approach. Understanding object-oriented programming. Class and object concepts. Creating classes and objects. The class constructor is the init method. Practical Lesson No1 An Overview of Object-Oriented Programming. Class and Object Concepts Lab-to-Lab No2: Creating Classes and Features	OPK-3 ID-3OPK-3 OPK-4 ID-4OPK-4 OPK-5 ID-2OPK-5 OPK-5 ID-3OPK-5	-	-	6		8	Interview

	Practical Lesson No3 Class Constructor – Init Method							
2	Basic abstractions of object-oriented analysis and programming. Inheritance in OOP in Python. Polymorphism and method overrides in OOP in Python. Practical Lesson No4 Inheritance in OOP in Python Practical Lesson No5 Polymorphism and Method Overrides in OOP in Python	OPK-3 ID-3OPK-3 OPK-4 ID-4OPK-4 OPK-5 ID-2OPK-5 OPK-5 ID-3OPK-5	-	-	6		8	Interview
3	Methods and mechanisms for the development of object-oriented programs. Modules and their import. Lines of documentation for Python source code. Practical Lesson No6 Modules and Their Import Hands-on Lesson No7 Lines of Python Source Code Documentation	OPK-3 ID-3OPK-3 OPK-4 ID-4OPK-4 OPK-5 ID-2OPK-5 OPK-5 ID-3OPK-5	-	-	6		8	Interview
4	Preparation and passing of intermediate certification. Operator overload in OOP. Features of object-oriented programming. Develop your own object-oriented application in Python. Practical Lesson No8 Overloading Operators in the HHP Practical Lesson No9 Features of Object-Oriented Programming Lab-to-Lab No10	OPK-3 ID-3OPK-3 OPK-4 ID-4OPK-4 OPK-5 ID-2OPK-5 OPK-5 ID-3OPK-5	-	-	6		6	Interview

	Developing Your Own Python Object-Oriented Application							
	Exam preparation						54	
	TOTAL for the 5th semester		-	-	24		30	
	TOTAL		-	-	24		84	

6. Fund of assessment tools for current monitoring of progress and intermediate certification of students in the discipline (module)

The Assessment Tools Fund (ASF) for current monitoring of progress and intermediate certification of students in the discipline (module) "Object-Oriented Programming" is based on a list of mastered competencies with an indication of the stages of their formation in the process of mastering the discipline (module). The CSF provides objective control over the achievement of the planned learning outcomes. The CSF includes:

- description of indicators and criteria for assessing competencies at various stages of their formation, description of assessment scales;
- methodological materials that determine the procedures for assessing knowledge, skills, and (or) experience of activity, characterizing the stages of competence formation;
- standard control tasks and other materials necessary to assess knowledge, skills and the level of mastery of the formed competencies in the process of mastering the discipline (module).

The FAT is an appendix to this program of the discipline (module).

7. Methodical instructions for students on the development of the discipline

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

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

The lecture material is devoted to the consideration of the key, basic provisions of the courses and the explanation of educational tasks submitted for independent work of students.

Practical classes are conducted in order to consolidate the learned information, to acquire skills for its application in solving practical problems in the relevant subject area.

Independent work of students is aimed at independent study of additional material, preparation for practical classes, as well as the performance of all types of independent work.

For the successful development of the discipline, it is necessary to perform all types of independent work, using the recommended sources of information.

8. Educational, methodological and information support of the discipline

8.1. List of basic and additional literature necessary for mastering the discipline (module)

8.1.1. List of basic literature:

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

Borzunov S. V., Kurgalin S. D. : textbook for universities. - St. Petersburg: Lan, 2020. - 444 p. - ISBN 978-5-8114-5489-1

Shkaberina, G. Sh.; Programming. Fundamentals of the Python Language Elektronnyy resurs / Shkaberina G. Sh., Rezova N. L. : textbook. - Krasnoyarsk : SibSU named after Academician M. F. Reshetnev, 2018. - 92 p. - APPROVED BY the Editorial and Publishing Council of the University as a textbook for undergraduate students in the areas of training 09.03.01 "Informatics and Computer Engineering", 09.03.02 "Information Systems and Technologies", 09.03.04 "Software Engineering" of all forms of training

8.1.2. List of additional literature:

Suzi, R.A. Programming language Python Electronic resource: textbook / R.A. Susi. - Programming language Python, 2020-07-28. - Moscow : Internet University of Information Technologies (INTUIT), 2016. - 350 p. - The book is in the basic version of the EBS IPRbooks. - ISBN 5-9556-0058-2

Sheludko, V. M. Osnovy premenirovaniya na yazyke vysokogo urovnya Python Elektronnoye resurs : Uchebnoye posobie [Fundamentals of programming in the high-level language Python]. - Rostov-on-Don, Taganrog : Publishing House of the Southern Federal University, 2017. - 146 p. - The book is in the premium version of EBS IPR BOOKS. - ISBN 978-5-9275-2649-9

Sheludko, V. M. Programming language of high level Python. Functions, data structures, additional modules Electronic resource: Textbook. - Rostov-on-Don, Taganrog: Publishing House of the Southern Federal University, 2017. - 107 p. - The book is in the premium version of EBS IPR BOOKS. - ISBN 978-5-9275-2648-2

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

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

Voronkin R. A., Fundamentals of Software Engineering. Laboratory Practicum

Suzi, R.A. Programming language Python Electronic resource: textbook / R.A. Susi. - Programming language Python, 2020-07-28. - Moscow : Internet University of Information Technologies (INTUIT), 2016. - 350 p. - The book is in the basic version of the EBS IPRbooks. - ISBN 5-9556-0058-2

Sheludko V. M. Osnovy premenirovaniya na yazyke vysokogo urovnya Python : uchebnoe posobie [Fundamentals of programming in the high-level language Python: a textbook]. - Rostov-on-Don|Taganrog : Publishing House of the Southern Federal University, 2017. - 147 p. : ill. - <http://biblioclub.ru/>. - Bibliogr. in the book. - ISBN 978-5-9275-2649-9

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

Electronic Library "University Library NLINE" <http://biblioclub.ru>.

EBS«IPRbooks» <http://www.iprbookshop.ru>

NCFU Electronic Catalog <http://catalog.ncfu.ru/catalog/ncfu>.

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

GitHub

Information reference systems:

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

1	www.biblioclub.ru - Electronic Library System "University Library Online"
2	www.eLibrary.ru - Scientific Electronic Library
3	www.iprbookshop.ru - IPRbooks Electronic Library System
4	http://www.edu.ru – Federal Portal. Russian Education.

Software:

1	Viola Workstation 10
2	Alt Workstation K
3	Viola "Server"
4	Office software package - P7-Office

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

The material and technical base provides all types of disciplinary and interdisciplinary training, laboratory, research work of students (portable laptop, portable projector, computers with the necessary software and Internet access).

Lectures	1	Interactive whiteboard Hitahci-Trio-77.1573*1180mm,US
	2	Projector Acer P1266i DLP 2700
Practical exercises	1	A general-purpose computer class with a PC configuration no worse than that recommended for Windows 8-10 with an Internet connection.
Independent work	1	A general-purpose computer class with a PC configuration no worse than that recommended for Windows 8-10 with an Internet connection.
Practical training	1	It is carried out in the structural divisions of the university and (or) in organizations that carry out activities in the profile of the relevant educational program, including its structural subdivision

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 (assistant) who provides students with the necessary technical assistance, as well as the services of sign language interpreters and typhlo-sign interpreters.

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

The development 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 the accessibility of higher education under the educational program by persons with disabilities when mastering the discipline (module), the following is ensured:

1) for visually impaired persons:

- the presence of an assistant who provides the student with the necessary technical assistance, taking into account individual characteristics (helps to take a workplace, move, read and complete the task, including by writing down by dictation),
- written tasks, as well as instructions on the procedure for their implementation, are drawn up in enlarged font,
- special textbooks, teaching aids and didactic materials (with large print or audio files),
- individual uniform lighting of at least 300 lux,
- if necessary, the student is provided with a magnifying device to complete the task;

2) for persons with hearing disabilities:

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

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

- written tasks are performed on a computer with specialized software or dictated to an assistant;
- At the request of the student, tasks can be performed orally.

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

According to Part 1 of Article 16 of the Federal Law of December 29, 2012 No 273-FZ "On Education in the Russian Federation", e-learning is understood as the organization of educational activities with the use of information contained in databases and used in the implementation of educational programs and information technologies, technical means, as well as information and telecommunication networks that ensure the transmission of this information through communication lines, the interaction of students and teachers. Distance educational technologies are understood as educational technologies implemented mainly with the use of information and telecommunication networks with indirect (at a distance) interaction of students and teachers.

The discipline can be implemented using distance learning technologies and e-learning in whole or in part. The components of the discipline's teaching materials (the discipline's work program, assessment and methodological materials, forms of certification), implemented using distance learning technologies and e-learning, contain an indication of their use.

When organizing educational activities with the use of distance educational technologies and e-learning, asynchronous and synchronous ways of interacting with participants in educational relations through the information and telecommunication network "Internet" may be provided.

When using distance learning technologies and e-learning, the schedule for the discipline indicates: ways of interaction between participants in educational relations through the information and telecommunication network "Internet" (videoconferencing, ET - electronic testing); links to the electronic information and educational environment of NCFU, to educational platforms and resources of other organizations to which open access is provided through the information and telecommunication network "Internet"; for synchronous learning - the time of online classes and teachers; for asynchronous learning - the authors of online courses.

When organizing interim certification using distance learning technologies and e-learning, the Methodological Recommendations for the Use of Technical Means That Ensure the Objectivity of Results in the Conduct of Interim and State Final Certification in Educational Programs of Higher Education - Bachelor's Degree Programs, Specialist Programs and Master's Degree Programs with the Use of Distance Educational Technologies (Letter of the Ministry of Education and Education of Russia dated 07.12.2020 No MN-19/1573-AN "On the Direction of Methodological Recommendations") are used.

The implementation of the discipline using e-learning and distance learning technologies is carried out using the electronic information and educational environment of NCFU, to which students have access through the information and telecommunication network "Internet", or using the resources of other organizations, including platforms that provide services for video conferences, online meetings and distance learning (MTS-Link), as well as using the capabilities of social networks for communication between students and teachers.

Educational and methodological support of the discipline implemented with the use of e-learning and distance educational technologies includes a work program, teaching aids or a course of lectures presented in electronic form, guidelines for the implementation of various types of educational activities of students provided for by the discipline, and other educational materials posted in the information and educational environment of NCFU.