

Документ подписан простой электронной подписью
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**Federal State Autonomous Educational Institution of Higher Education
"Peoples' Friendship University of Russia named after Patrice Lumumba"**

Academy of Engineering

(name of the main educational unit (MEU) that developed the educational program of higher education)

WORKING PROGRAM OF THE DISCIPLINE

BLOCKCHAIN TECHNOLOGY

(name of discipline/module)

Recommended for the field of study/specialty:

27.04.04 CONTROL IN TECHNICAL SYSTEMS

(code and name of the training area/specialty)

The discipline is mastered within the framework of the implementation of the main professional educational program of higher education (EP HE):

**AIML and Space Sciences / Artificial Intelligence, Machine Learning and Space
Sciences**

(name (profile/specialization) of the educational institution of higher education)

1. THE GOAL OF MASTERING THE DISCIPLINE

The discipline "Blockchain Technology" is part of the master's program "Artificial Intelligence, Machine Learning and Space Sciences" in the direction 27.04.04 "Control in Technical Systems" and is studied in the 2nd semester of the 1st year. The discipline is implemented by the Department of the Partner University. The discipline consists of 4 sections and 9 topics and is aimed at studying the application of cryptographic methods for data protection in blockchain systems; specialized software and libraries for the implementation of cryptographic protection in blockchain projects.

The purpose of mastering the discipline is to form in students a systemic understanding of blockchain technology, its architecture, principles of operation and the possibilities of application for solving current problems in the field of information security.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Blockchain technology" is aimed at developing the following competencies (parts of competencies) in students:

Table 2.1. List of competencies developed in students while mastering the discipline (results of mastering the discipline)

Cipher	Competence	Indicators of Competence Achievement (within the framework of this discipline)
GPC-8	Able to select methods and develop control systems for complex technical objects and technological processes	GPC-8.1 Knows the basic methods used to develop control systems for complex technical objects and technological processes; GPC-8.2 Can develop control systems for complex technical objects and technological processes; GPC-8.3 Has skills in selecting methods and developing control systems for complex technical objects and technological processes;

3. PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL EDUCATION

Discipline "Blockchain Technology" refers to the mandatory part of block 1 "Disciplines (modules)" of the educational program of higher education.

As part of the higher education program, students also master other disciplines and/or practices that contribute to the achievement of the planned results of mastering the discipline "Blockchain Technology".

Table 3.1. List of components of the educational program of higher education that contribute to the achievement of the planned results of mastering the discipline

Cipher	Name of competence	Previous courses/modules, practices*	Subsequent disciplines/modules, practices*
GPC-8	Able to select methods and develop control systems for complex technical objects and technological processes	Design and Analysis of Algorithms; Python for Data Science;	Undergraduate practice / Pre-graduation practice;

* - filled in in accordance with the competency matrix and the SUP EP HE

** - elective disciplines/practices

4. SCOPE OF THE DISCIPLINE AND TYPES OF STUDY WORK

The total workload of the “Blockchain Technology” discipline is “4” credits.

Table 4.1. Types of educational work by periods of mastering the educational program of higher education for full-time education.

Type of academic work	TOTAL,ac.h.		Semester(s)
			2
<i>Contact work, academic hours</i>	34		34
Lectures (LC)	17		17
Laboratory work (LW)	17		17
Practical/seminar classes (SC)	0		0
<i>Independent work of students, academic hours</i>	83		83
<i>Control (exam/test with assessment), academic hours</i>	27		27
General complexity of the discipline	ac.h.	144	144
	credit.ed.	4	4

5. CONTENT OF THE DISCIPLINE

Table 5.1. Contents of the discipline (module) by types of academic work

Section number	Name of the discipline section	Section Contents (Topics)		Type of academic work*
Section 1	Principles and mechanisms of functioning of distributed ledger technologies	1.1	Distributed ledger: concept. History of the mathematical proof of Byzantine fault tolerance (BFT) and the principle of proof of work done work (PoW).	LC
		1.2	History of the formation of blockchain. Consensus algorithms (PoW, PoS, etc.)	LC, LW
Section 2	Application of blockchain in management. Smart contracting. Smart contracts and conditions for their effective use. Hardware and software components.	2.1	Distributed ledger as a system of peer-to-peer regulation of behavior. Making a decision on confirming a new block. Peer-to-peer relations. Issues of distributed computing and distributed registries as a system for storing information. Updating information. Hash functions	LC
		2.2	Application of blockchain technologies in process management, information flows, optimization of the network of communication channels for storing and transmitting data. Smart contracts in energy, smart home, smart city	LC, LW
		2.3	Government systems on blockchain, cadastral chambers, interactive 5D maps.	LC, LW
Section 3	Blockchain platforms, types of blockchains. Public and corporate blockchain networks. Open and closed protocols	3.1	Blockchain platforms with closed and open source code: Ethereum, Bitcoin; Hyperledger, Corda.	LC
		3.2	Implementation of corporate solutions on the blockchain: Smart Fuel. Open Ethereum protocols, their use for solving management problems. Masterchain as an example of a state blockchain platform.	LC, LW
Section 4	TLCens and tLCenization. Internet of values. Cryptocurrencies. NFT	4.1	TLCen as an expression of value. Internet of things and Internet of values. History of cryptocurrencies and “stable tLCens” tied to real assets (stable coins).	LC
		4.2	TLCenization in intangible production, NFT, reputation tLCens. Digital diplomas	LC, LW

* - filled in only for FULL-TIME education: LC – lectures; LW – laboratory work; SC– practical/seminar classes.

6. LOGISTIC AND TECHNICAL SUPPORT OF DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type	Equipping the auditorium	Specialized educational/laboratory equipment, software and materials for mastering the discipline (if necessary)
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means for multimedia presentations.	
Computer class	A computer room for conducting classes, group and individual consultations, ongoing	

Audience type	Equipping the auditorium	Specialized educational/laboratory equipment, software and materials for mastering the discipline (if necessary)
	monitoring and midterm assessment, equipped with personal computers (14 in total), a board (screen) and technical means for multimedia presentations.	
For independent work	A classroom for independent work of students (can be used for conducting seminars and consultations), equipped with a set of specialized furniture and computers with access to the Electronic Information System.	

* - the audience for independent work of students MUST be indicated!

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main literature:

- 1.
- 2.

Further reading:

- 1.
- 2.

Resources of the information and telecommunications network "Internet":

1. RUDN University EBS and third-party EBSs to which university students have access on the basis of concluded agreements

- Electronic library system of RUDN - ELS RUDN

<https://mega.rudn.ru/MegaPro/Web>

- Electronic library system "University library online" <http://www.biblioclub.ru>

- EBS "Yurait" <http://www.biblio-online.ru>

- Electronic Library System "Student Consultant" www.studentlibrary.ru

- EBS "Znaniy" <https://znaniy.ru/>

2. Databases and search engines

- Sage <https://journals.sagepub.com/>

- Springer Nature Link <https://link.springer.com/>

- Wiley Journal Database <https://onlinelibrary.wiley.com/>

- Scientometric database Lens.org <https://www.lens.org>

Educational and methodological materials for independent work of students in mastering a discipline/module:*

1. Lecture course on the subject "Technologiesblockchain».

* - all educational and methodological materials for independent work of students are posted in accordance with the current procedure on the discipline page in TUIS!

DEVELOPER:

Associate Professor		Saltykova Olga Alexandrovna
<i>Position, Department</i>	<i>Signature</i>	<i>Surname I.O.</i>

HEAD OF THE DEPARTMENT:

<i>Position of the Department</i>	<i>Signature</i>	<i>Surname I.O.</i>

HEAD OF THE EP HE:

Head of Department		Razumny Yuri Nikolaevich
<i>Position, Department</i>	<i>Signature</i>	<i>Surname I.O.</i>