**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

RELATIONAL DATABASE MANAGEMENT SYSTEM

(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)

2025

1. THE GOAL OF MASTERING THE DISCIPLINE

The discipline "Relational Database Management System" is included in 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 1st semester of the 1st year. The discipline is implemented by the Department of the Partner University. The discipline consists of 3 sections and 6 topics and is aimed at studying the main methods of building databases and data banks, modern database management systems, acquiring practical skills in building databases and data banks.

The purpose of mastering the discipline is to develop the student's competencies in the field of building databases and data banks, studying database management systems and their use in creating information systems for various technological processes and industries based on current methodological and regulatory documents and technical documentation.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Relational Database Management System" 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-5	Capable of conducting patent research, determining forms and methods of legal protection and defense of rights to the results of intellectual activity, managing rights to them to solve problems in the development of science, engineering and technology	GPC-5.1 Knows the methods and approaches to conducting patent research, forms and methods of legal protection and defense of rights to the results of intellectual activity; GPC-5.2 Able to manage rights to the results of intellectual activity to solve problems in the field of development of science, engineering and technology; GPC-5.3 Has knowledge of methods and approaches to conducting patent research, knows methods of legal protection and defense of rights to the results of intellectual activity;
GPC-6	Capable of collecting and analyzing scientific and technical information, generalizing domestic and foreign experience in the field of automation and control equipment	GPC-6.1 Knows the basic methods of collecting and analyzing scientific and technical information; GPC-6.2 Able to analyze and generalize domestic and foreign experience in the field of automation and control equipment; GPC-6.3 Has knowledge of methods for collecting and analyzing scientific and technical information, and can also generalize domestic and foreign experience in the professional field;

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

Discipline "Relational Database Management System" 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 "Relational Database Management System".

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-6	Capable of collecting and analyzing scientific and technical information, generalizing domestic and foreign experience in the field of automation and control equipment		Research work / Research work (acquiring primary skills in research work); Undergraduate practice / Pre-graduation practice; Research Work; Technology Threats and Cybersecurity Systems; Inferential Statistics;
GPC-5	Capable of conducting patent research, determining forms and methods of legal protection and defense of rights to the results of intellectual activity, managing rights to them to solve problems in the development of science, engineering and technology		Research work / Research work (acquiring primary skills in research work); Undergraduate practice / Pre-graduation practice; Research Work;

* - 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 discipline "Relational Database Management System" is "4" credit units.

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)
			1
Contact work, academic hours	*34*		*34*
Lectures (LC)	17		17
Laboratory work (LW)	17		17
Practical/seminar classes (SC)	0		0
Independent work of students, academic hours	*74*		*74*
Control (exam/test with assessment), academic hours	*36*		*36*
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	Data models and database management systems	1.1	Data models. Basic data models. Hierarchical model. Basic properties of hierarchical models. Network model. Main properties of network models. Relational model. Main properties of relational models. Post-relational model. Main properties of post-relational models. Object-oriented model. Main properties of object-oriented models.	LC, LW
		1.2	Relational database management system. Relational DBMS. Attributes. Schemas. Tuples. Domains. Representation forms relations. Relationship instances. Transforming ER diagrams to relational schemas. Relationship keys. Trivial functional dependencies. Designing relational schemas.	LC, LW
Section 2	Design of databases and data banks	2.1	Database design stages. Main stages and levels of database creation and corresponding models. Subject area. Description of the subject area. Subject area limitations. Infological model of the subject area. Datalogical model of the database. Physical model of the database. Creating a database.	LC, LW
		2.2	Database design. Basic design principles. Data reliability. No data redundancy. Simplicity database structures. Selecting appropriate relationships. Using elements of adequate types. Designing programs, transactions, triggers.	LC, LW
Section 3	Programming in SQL language	3.1	SQL language. The standard language for database design. Simple SQL queries. Queries across multiple relations. Subqueries. Join expressions in SQL. Natural join. Outer joins. Grouping and aggregation in SQL. Updating data. Data types. Indexes. Creating and deleting indexes. Views. Creating and deleting views. View queries.	LC, LW
		3.2	Stored procedures and functions. Creating stored procedures and functions. Basic properties of stored procedures and functions. Simple forms of expressions. Branching. LOOP loops. For loops. Using stored procedures and functions.	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 monitoring and midterm assessment, equipped with personal computers (in the amount of [Parameter] pcs.), 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. Setyawati E. et al. Relational Database Management System (RDBMS). – 2020.
2. Gillenson ML Fundamentals of database management systems. – John Wiley & Sons, 2023.

Further reading:
1. Sumathi S., Esakkirajan S. Fundamentals of relational database management systems. – Springer Science & Business Media, 2007. – T. 47.
2. Alvarez PM, Ayala ML, Cisneros SO Main Memory Management on Relational Database Systems. – Springer International Publishing, 2022.

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 Yuraithttp://www.biblio-online.ru
- Electronic Library System "Student Consultant" www.studentlibrary.ru
- EBS "Znanium"https://znanium.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 "Relational Database Management System".

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

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