

Документ подписан простой электронной подписью
Информация о владельце:
ФИО: Ястребов Олег Александрович
Должность: Ректор
Дата подписания: 30.05.2024 13:48:58
Уникальный программный ключ:
ca953a0120d891083f939673078ef1a989dae18a

**Federal State Autonomous Educational Institution of Higher Education
"Russian Peoples' Friendship University named after Patrice Lumumba"**

Engineering Academy

(name of the main educational unit (POU) - developer of the EP HE)

DISCIPLINE WORK PROGRAM

DATABASE

(name of discipline/module)

Recommended by MSSN for the following areas of training/specialty:

01.04.02 APPLIED MATHEMATICS AND INFORMATION SCIENCE

(code and name of the area of training/specialty)

The discipline is mastered as part of the implementation of the main professional educational program of higher education (OP HE):

BALLISTIC DESIGN OF SPACE COMPLEXES AND SYSTEMS

(name (profile/specialization) EP HE)

1. GOAL OF DISCIPLINE MASTERING

The discipline “Databases” is included in the master’s program “Ballistic design of space complexes and systems” in the direction 01.04.02 “Applied mathematics and computer science” and is studied in the 1st semester of the 1st year. The discipline is implemented by the Department of Mechanics and Control Processes. The discipline consists of 5 sections and 27 topics and is aimed at studying the fundamentals of physical and logical design of databases, type and properties of normal forms, semantic modeling of data, external memory structures, methods of indexes organization, client-server organization of data and database protection; analysis of the basic methods of solving typical problems and familiarity with the area of their application in professional activity

The goal of mastering the discipline is to form fundamental knowledge and skills of application of methods of solving problems necessary for professional activity, increase the general level of students' literacy in database design

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline “Databases” is aimed at developing the following competencies (parts of competencies) in students:

Table 2.1. List of competencies formed in students when mastering the discipline (results of mastering the discipline)

Cipher	Competence	Indicators of Competency Achievement (within this discipline)
UK-1	Able to critically analyze problem situations based on a systematic approach and develop an action strategy	UK-1.1 Analyzes the task, highlighting its basic components;; UK-1.2 Identifies and ranks the information required to solve the task;; UK-1.3 Searches for information to solve a given problem using various types of requests;; UK-1.4 Offers options for solving a problem, analyzes the possible consequences of their use;;
OPK-4	Able to combine and adapt existing information and communication technologies to solve problems in the field of professional activity, taking into account information security requirements	GPC-4.1 Analyzes problems of applied mathematics and computer science using information technology;; OPK-4.2 Takes into account the basic requirements of information security;; OPK-4.3 Uses modern information and communication technologies to solve problems in the field of applied mathematics and computer science, taking into account information security requirements.;
PC-1	Able to formulate goals and objectives of scientific research in the field of applied mathematics and computer science, computer technology and modern programming technologies, select methods and means for solving problems	PC-1.1 Has fundamental knowledge acquired in the field of mathematical and (or) natural sciences, programming and information technology;; PC-1.2 Can find, formulate and solve standard problems in their own research activities in the field of applied mathematics and computer science, computer technology and modern programming technologies;; PC-1.3 Has practical experience in research activities in the field of applied mathematics and computer science, computer technology and modern programming technologies.;
PC-2	Able to apply modern theoretical and experimental methods for developing mathematical models of studied objects and processes related to professional activities in the field of training and participate in their	PC-2.1 Knows modern theoretical and experimental methods for developing mathematical models, innovative design tools and elements of architectural solutions of information systems;; PC-2.2 Can develop and implement algorithms for mathematical models based on languages and application packages for modeling;; PC-2.3 Has practical experience in developing options for implementing information systems using innovative tools.;

Cipher	Competence	Indicators of Competency Achievement (within this discipline)
	implementation in the form of software products	

3. PLACE OF DISCIPLINE IN THE STRUCTURE OF HE EP

Discipline "Databases" refers to the mandatory part of block 1 “Disciplines (modules)” of the educational program of higher education.

As part of the educational program of higher education, students also master other disciplines and/or practices that contribute to achieving the planned results of mastering the “Database” discipline.

Table 3.1. List of components of EP HE that contribute to achieving the planned results of mastering the discipline

Cipher	Name of competency	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
UK-1	Able to critically analyze problem situations based on a systematic approach and develop an action strategy		Advanced Methods of Remote Sensing and Geoinformation Systems; Structures & Materials Modeling; System Design; Dynamics and Control of Space Systems; Project "Drone Systems Engineering. Part 1"; Practical Training in Receiving Remote Sensing Data from Satellites and its Interpretation (online from RUDN Mission Control Center) / Research; Practical Training and Research in Dynamics and Control of Space Systems (online from RUDN Mission Control Center) / Research work; Technological Training; Pre-Graduation Internship in Industry;
OPK-4	Able to combine and adapt existing information and communication technologies to solve problems in the field of professional activity, taking into account information security requirements		Pre-Graduation Internship in Industry; Practical Training in Receiving Remote Sensing Data from Satellites and its Interpretation (online from RUDN Mission Control Center) / Research; Practical Training and Research in Dynamics and Control of Space Systems (online from RUDN Mission Control Center) / Research work;

Cipher	Name of competency	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
			Technological Training; Project "Drone Systems Engineering. Part 1"; Project "Drone Systems Engineering. Part 2";
PC-1	Able to formulate goals and objectives of scientific research in the field of applied mathematics and computer science, computer technology and modern programming technologies, select methods and means for solving problems		Advanced Methods of Remote Sensing and Geoinformation Systems; System Design; Dynamics and Control of Space Systems; Pre-Graduation Internship in Industry; Practical Training in Receiving Remote Sensing Data from Satellites and its Interpretation (online from RUDN Mission Control Center) / Research; Practical Training and Research in Dynamics and Control of Space Systems (online from RUDN Mission Control Center) / Research work; Technological Training;
PC-2	Able to apply modern theoretical and experimental methods for developing mathematical models of studied objects and processes related to professional activities in the field of training and participate in their implementation in the form of software products		Advanced Methods of Remote Sensing and Geoinformation Systems; System Design; Project "Drone Systems Engineering. Part 1"; Pre-Graduation Internship in Industry; Practical Training in Receiving Remote Sensing Data from Satellites and its Interpretation (online from RUDN Mission Control Center) / Research; Practical Training and Research in Dynamics and Control of Space Systems (online from RUDN Mission Control Center) / Research work; Technological Training;

* - to be filled out in accordance with the competency matrix and SUP EP VO

** - elective disciplines/practices

4. SCOPE OF DISCIPLINE AND TYPES OF STUDY WORK

The total labor intensity of the “Databases” discipline is “2” credit units.

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

Type of educational work	TOTAL,ac.ch.		Semester(s)
			1
<i>Contact work, ac.ch.</i>	20		20
Lectures (LK)	10		10
Laboratory work (LR)	10		10
Practical/seminar sessions (SZ)	0		0
<i>Independent work of students, ac.ch.</i>	52		52
<i>Control (exam/test with assessment), academic degree.</i>	0		0
Total labor intensity of the discipline	ac.ch.	72	72
	credit units	2	2

5. CONTENT OF DISCIPLINE

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

Section number	Name of the discipline section	Contents of the section (topic)		Type of educational work*
Section 1	Introduction. Physical database design. Logical database design. Designing relational databases using normalization.	1.1	Aspects of database design	LK, LR
		1.2	Automatic consistency checking of a set of integrity constraints	LK, LR
		1.3	Database design problems	LK, LR
Section 2	Types of normal forms. Basic properties of normal forms.	2.1	Classical design approach in terms of relational data model by method of successive approximations to a satisfactory set of relationship schemas	LK, LR
		2.2	Representation of the subject domain as one or more relations.	LK, LR
		2.3	The design process as a process of normalization of relationship schemas.	LK, LR
		2.4	Sequence of normal forms	LK, LR
Section 3	Semantic modeling of data, ER-charts Semantic ER-model (Entity - Connections)	3.1	Limitations of the relational data model	LK, LR
		3.2	Insufficient representation of the meaning of the data.	LK, LR
		3.3	The semantics of the real domain	LK, LR
		3.4	Model-independent	LK, LR
		3.5	The problem of representing integrity constraints in the context of ER diagrams	LK, LR
		3.6	Varieties of ER-models.	LK, LR
		3.7	Designing the domain	LK, LR
3.8	Graphical diagrams.	LK, LR		
Section 4	External memory structures, methods of index organization. Methods of physical organization of data	4.1	Organization of external memory. Two-level system	LK, LR
		4.2	The level of direct data management in the external memory.	LK, LR
		4.3	Transaction management and logging of database changes.	LK, LR
		4.4	Managing the level that implements the SQL language. The organization of the lower level subsystem must manage the memory.	LK, LR
		4.5	The functions of the upper level subsystem.	LK, LR
		4.6	Index-sequential and index-arbitrary data organization. Methods of accessing the data. Hashing method.	LK, LR
		4.7	Advantages and disadvantages of the main methods of storing and retrieving data / Index-sequential and index-arbitrary data organization. Data access methods	LK, LR
		4.8	Advantages and disadvantages of the main data storage and retrieval methods.	LK, LR
Section 5	Client-server data organization. Database protection. Data protection system in Access Server data management systems	5.1	Client-server data organization models. Two-tier and tiered systems.	LK, LR
		5.2	The main tasks to be solved in multi-user systems. Database replications.	LK, LR
		5.3	Physical, organizational and cryptographic methods of data protection.	LK, LR
		5.4	Data protection models: discretionary and mandated. Remote user authentication	LK, LR

* - to be filled out only for full-time education: LC – lectures; LR – laboratory work; SZ – practical/seminar classes.

6. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type	Auditorium equipment	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; board (screen) and technical means of multimedia presentations.	
Computer class	Computer class for conducting classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with personal computers (15 pcs.), a whiteboard (screen) and technical means for multimedia presentations.	
For independent work	An auditorium for independent work by students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to EIOS.	

* - the audience for independent work of students is MANDATORY!

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF DISCIPLINE

Main literature:

1. A. Khomonenko, V. Tsygankov, M. Maltsev. Databases, 6th edition, M. Binom-Press, 2008, 736 p.
2. Glushakov, Sergey Vladimirvoich. Microsoft Access 2007: the best tutorial / S. V. Glushakov, A. S. Suryadny, M. I. Shumilov., 2nd ed., add. and Arab., M.: AST, 2008, 444 p.
3. Kuzin, Alexander Vladimirovich. Development of databases in Microsoft Access: textbook. for students avg. prof. education / A.V. Kuzin, V.M. Demin., 3rd ed., M.: Forum, 2009., 224 p.

Additional literature:

1. Date K. Introduction to database systems: [Text. manual: Transl. from English] / K. Deit., 6th ed., M. et al.: Publishing house. house "Williams", 2000., 846 p.
2. Meyer D. Theory of relational databases / D. Meyer; edited by M. Sh. Tsalenko; lane from English M.K. Valieva [and others]., M.: Mir, 1987., 608 p.

Resources of the information and telecommunications network "Internet":

1. EBS of RUDN University and third-party EBS, to which university students have access based on concluded agreements
 - Electronic library system of RUDN - EBS RUDN <http://lib.rudn.ru/MegaPro/Web>
 - EBS "University Library Online" <http://www.biblioclub.ru>
 - EBS Yurayt <http://www.biblio-online.ru>
 - EBS "Student Consultant" www.studentlibrary.ru
 - EBS "Trinity Bridge"
2. Databases and search engines

- electronic fund of legal and regulatory technical documentation
<http://docs.cntd.ru/>

- Yandex search engine <https://www.yandex.ru/>

- Google search engine <https://www.google.ru/>

- SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>

Educational and methodological materials for students' independent work when mastering a discipline/module:*

1. A course of lectures on the discipline "Databases".

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

8. ASSESSMENT MATERIALS AND POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCIES FOR A DISCIPLINE

Evaluation materials and point-rating system* for assessing the level of development of competencies (parts of competencies) based on the results of mastering the discipline "Databases" are presented in the Appendix to this Work Program of the discipline.

* - OM and BRS are formed on the basis of the requirements of the relevant local regulatory act of RUDN University.

DEVELOPER:

Assistant professor

Position, PBU

Signature

Kruglova Larisa
Vladimirovna

Last name I.O.

HEAD OF BUP:

Head of the department

Position PBU

Signature

Razumny Yuri Nikolaevich

Last name I.O.

HEAD OF OP VO:

Professor

Position, PBU

Signature

Razumny Yuri Nikolaevich

Last name I.O.