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Информация о владельце:
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Должность: Ректор
Дата подписания: 15.05.2024 16:14:52
Уникальный программный ключ:
ca953a0120d891083f939673078ef1a989dae18a

**Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
(RUDN University)
Economic Faculty**

COURSE SYLLABUS

BIG DATA

**Recommended by the Didactic Council for the Education Field of
38.03.01 Economics**

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

**The development of the discipline is carried out within the framework of the
implementation of the main professional educational program of higher education:**

International Economic Relations

(name (profile/specialization))

1. COURSE GOALS

The purpose of mastering the discipline "Big Data" is to provide students with the necessary knowledge and skills to work with big data based on relational and non-relational databases.

The main objectives of the course are:

- study of the basic concepts related to big data, their storage and processing.
- basic principles of working with relational databases and building a database architecture;
- mastering basic knowledge of SQL query language and data visualization;
- study of the main types of data processing, introduction to modern big data processing languages.

2. LEARNING OUTCOMES

Studying the discipline "Big Data" is aimed at the formation of the following competencies (parts of competencies) in students:

Table 2.1. List of competencies formed by students during the development of the discipline (results of the development of the discipline)

Competence code	Competence	Competence indicators
GC-12	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data	GC-12. Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data
		GC-12. Know how to search for the necessary sources of information and data, perceives, analyzes, memorizes and transmits information using digital means, as well as using algorithms when working with data received from various sources in order to effectively use the information received to solve problems

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Big Data" refers to the part formed by the participants of the educational relations of the block Б1.Б.ДБ.13.01

Within the framework of the educational program, students also master other disciplines and/or practices that contribute to achieving the planned results of mastering the discipline "Big Data".

Table 3.1. The list of the components of the educational program that contribute to the achievement of the planned results of the development of the discipline

Code	Competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
GPC-2	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data	Computer science; Statistics for Economists; Economic informatics; International statistical databases; Interdisciplinary coursework; Interdisciplinary course project; Business process modeling; Geographic Information Systems: Visualization of Spatial Data; Business on the Internet; Basics of international trade; Electronic commerce in international business.	Project-technological internship; Undergraduate practice; Final state examination procedures; Degree thesis procedures.

4. COURSE WORKLOAD AND LEARNING ACTIVITIES

The total labor intensity of the discipline "Big Data" is 3 credits.

TABLE 4.1. Types of academic activities during the period of the HE program (me) mastering

Type of educational work	TOTAL, academic hours	Semester
		7
<i>Contact., ac.h</i>	34	34
Lectures	0	0
Lab work	0	0
Seminars (workshops/tutorials)	34	34
<i>Self-study (ies), academic hours</i>	56	56
<i>Evaluation and assessment academic hours</i>	18	18
Overall labor intensity of the discipline	<i>academic hours</i>	108
	credits	3

5. COURSE MODULES AND CONTENTS

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

Course Modules and Contents	Modules and Topics (Units/Themes)	Type of educational work*
Section 1. Introduction to Big Data and Data Analysis.	Topic 1.1. The concept of big data. Big data storage. Big data in different industries. Online management of the company.	Lectures, Seminars
	Topic 1.2. Data driven and Data informed approaches in decision-making. Data analyst and his competencies.	Lectures, Seminars
	Topic 1.3. Trends in the use of data. Industry use of data.	Lectures, Seminars
Section 2. Introduction to SQL. Working with databases.	Topic 2.1. The concept of databases. DBMS functions. Introduction to SQL.	Lectures, Seminars
	Topic 2.2. Relational model. Primary keys, foreign keys, and database normalization. Database queries: syntax.	Lectures, Seminars
	Topic 2.3. Basic data types. Sorting, sampling, filtering. Work in the training database.	Lectures, Seminars
Section 3. SQL Basics.	Topic 3.1. Connections and types and connections. Logical structure and Venn diagram.	Lectures, Seminars
	Topic 3.2. Aggregate functions. Limitation.	Lectures, Seminars
	Topic 3.3. Grouping and filtering by specific values. Subqueries.	Lectures, Seminars
Section 4. Big Data Analysis using Python.	Topic 4.1. Introduction to Python and its application in big data. Python features.	Lectures, Seminars
	Topic 4.2. Arithmetic operations. Variables and variable naming.	Lectures, Seminars
	Topic 4.3. Comparison operators, conditions and conditional constructions. Logical operators and logical values.	Lectures, Seminars

* - заполняется только по **ОЧНОЙ** форме обучения: ЛК – лекции; ЛР – лабораторные работы; СЗ – семинарские занятия.

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Material and technical support of the discipline

Type of audience	Equipment of the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
Lecture hall	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	
Seminary	An auditorium for conducting seminar-type classes, group and individual consultations, ongoing monitoring and interim certification,	The list of specialized software installed on computers for mastering the

Type of audience	Equipment of the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
	equipped with a set of specialized furniture and multimedia presentation equipment.	discipline: Windows, Microsoft Office, Anaconda Navigator, Dbeaver, Superset, Internet access
Computer class	A computer classroom for conducting classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with personal computers (in the amount of ___ pcs.), a blackboard (screen) and multimedia presentation technical means.	The list of specialized software installed on computers for mastering the discipline: Windows, Microsoft Office, Anaconda Navigator, Dbeaver, Superset, Internet access
For independent work of students	An auditorium for independent work of 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. RECOMMENDED SOURCES FOR COURSE STUDIES

Main reading(sources)

1. Mark Lutz, Learning Python, Fifth Edition, O'Reilly, 2019.
2. Stef Maruch and Aahz Maruch, Python for Dummies, John Wiley & Sons, 2020, ISBN: 9780471778646.0020
3. David Beazley, Python Essential Reference, Third Edition, Sams Publishing, USA, 2020.
4. Allen Downey, Think Python, How to Think Like a Computer Scientist, Version 2.0.16, Green Tea Press, Needham, Massachusetts.
5. Wes McKinney, Python for Data Analysis, Wes McKinney. USA, 2021, ISBN: 978-1-449-31979-3.
6. Andrew Johansen, Python, The Ultimate Beginner's Guide!
7. Wesley J. Chun, Core Python Programming, First Edition, Prentice Hall PTR, 2021, ISBN: 0-13-026036-3, 8.
8. Peter Harrington, Machine Learning in Action, Manning Publishing Company, 2022.
9. Richard L. Halterman, Learning to Program with Python, Copyright © 2021 Richard L. Halterman.
10. Willi Richert, Luis Pedro Coelho, Building Machine Learning Systems with Python, Building Machine Learning Systems with Python, Packt Publishing, 2019.
11. Swaroop C.H. A byte of python. Учебное пособие по программированию на языке Python [Открытый доступ по ссылке](#)

<https://wombat.org.ua/AByteOfPython/AByteofPythonRussian-2.01.pdf>

Additional (optional) reading (sources)

1. Computer Science for economists: Textbook / Edited by V.M.Matyushka. – 2nd ed. reprint. and additional – M.: INFRA-M, 2016. – 460 p. + Additional. Materials [Electronic resource; Access mode <http://www.znaniy.com>]. - (Higher education: Bachelor's degree). – www.dx.doi.org/10.12737/6602.

Resources of the Internet information and telecommunication network:

1. EBS RUDN and third-party EBS, to which university students have access on the basis of concluded contracts:

- Electronic library system of RUDN – EBS RUDN <http://lib.rudn.ru/MegaPro/Web>
- EBS "University Library online" <http://www.biblioclub.ru>
- ABS Yurayt <http://www.biblio-online.ru>
- EBS "Student Consultant" www.studentlibrary.ru
- EBS "Doe" <http://e.lanbook.com/>
- EBS "Trinity Bridge"

Databases and search engines:

- electronic fund of legal and regulatory and 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.elsevier.com/locate/scopus/>

Educational and methodological materials for independent work of students during the development of the discipline/ module:*

1. A course of lectures on the discipline "Big Data".
2. Source files with program code for completing seminar assignments.

* - all teaching materials for independent work of students are placed in accordance with the current procedure on the discipline page in the TUIS!

8. EVALUATION TOOLKIT & GRADING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCIES IN THE COURSE

Evaluation materials and a grading system* for assessing the level of formation of competencies (part of competencies) based on the results of mastering the discipline "Big Data" are presented in the Appendix to this Course Syllabus of the discipline.

DEVELOPERS:

**Associate Professor of the
Department of Economic
and Mathematical Modeling**

K.G. Gomonov

Position, BUP

Signature

Surname.

HEAD OF THE BUP:

**Department of Economic and
Mathematical Modeling**

Balashova S.A.

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