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**FEDERAL STATE AUTONOMOUS EDUCATIONAL INSTITUTION OF
HIGHER EDUCATION PEOPLES' FRIENDSHIP UNIVERSITY OF
RUSSIA NAMED AFTER PATRICE LUMUMBA
RUDN UNIVERSITY
Faculty of Economics**

**COURSE
SYLLABUS
PYTHON AND SQL
FOR ECONOMISTS**

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

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

**The course instruction is implemented within the professional education programme of
higher education**
International Economic Relations

(name (profile/specialization))

1. COURSE GOALS

The goal 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:

- basic principles of working with relational databases and building a database architecture;
- mastering basic knowledge of the SQL query language and data visualization;
- learning the basics of object-oriented programming;
- learning Python libraries;
- mastering OOP models and metrics in solving applied problems;
- mastering skills in processing big data and building models in special software environments.

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, to perceive, to analyze, to memorize and to 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

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 mandatory component

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 laboriousness of the discipline "Big Data" is 2 credits.

TABLE 4.1. Types of academic activities during the period of the HE programme 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>		20	20
<i>Evaluation and assessment academic hours</i>		18	18
Overall laboriousness of the discipline	<i>academic hours</i>	72	72
	credits	2	2

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. Python	1.1. Basic operations, the first program, variables and conditional operators	Lectures, Seminars
	1.2. Data types.	Lectures, Seminars
	1.3. Loops and Functions	Lectures, Seminars
	1.4. Numpy scipy libraries	Lectures, Seminars
	1.5. Pandas Library	Lectures, Seminars
	1. 6. Matplotlib and seaborn visualization libraries	Lectures, Seminars
	1.7. EDA	Lectures, Seminars
Section 2. SQL	2.1. Relational databases. Installation lesson	Lectures, Seminars
	2.2. Relational databases. SQL: Basic queries, data types, filtering.	Lectures, Seminars
	2.3. Relational databases. SQL: Grouping functions, aggregate functions, filtering.	Lectures, Seminars
	Topic 4. Relational databases. SQL: Joins. Subqueries.	Lectures, Seminars
	2.5. Relational databases. SQL: Working with tables	Lectures, Seminars
	2.6. Relational databases. SQL: Views. Materialized views	Lectures, Seminars
	2.7. Relational databases. SQL: Window Functions	Lectures, Seminars

* - is filled only in the **full-time** form of training: LC - lectures; LR - laboratory work; SC - seminar classes

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 number 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!

RESOURCES RECOMMENDED FOR COURSE STUDY

Main reading(sources)

1. Data-driven innovation : big data for growth and well-being. – Paris: OECD, cop. 2020. - 452.; ISBN 978-92-64-22934-1
2. Mark Lutz, Learning Python, Fifth Edition, O'Reilly, 2019.
3. Stef Maruch and Aahz Maruch, Python for Dummies, John Wiley & Sons, 2020, ISBN: 9780471778646.0020
4. David Beazley, Python Essential Reference, Third Edition, Sams Publishing, USA, 2020.
5. Allen Downey, Think Python, How to Think Like a Computer Scientist, Version 2.0.16, Green Tea Press, Needham, Massachusetts.
6. Wes McKinney, Python for Data Analysis, Wes McKinney. USA, 2021, ISBN: 978-1-449-31979-3.
7. Andrew Johansen, Python, The Ultimate Beginner's Guide!
8. Wesley J. Chun, Core Python Programming, First Edition, Prentice Hall PTR, 2021, ISBN: 0-13-026036-3, 8.
9. Peter Harrington, Machine Learning in Action, Manning Publishing Company, 2022.
10. Richard L. Halterman, Learning to Program with Python, Copyright © 2021 Richard L. Halterman.
11. Willi Richert, Luis Pedro Coelho, Building Machine Learning Systems with Python, Building Machine Learning Systems with Python, Packt Publishing, 2019.
<https://wombat.org.ua/ABByteOfPython/ABByteofPythonRussian-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.znanium.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.elsevierscience.ru/products/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. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

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, ED	Signature	Surname.

HEAD OF THE ED:

**Department of Economic and
Mathematical Modeling**

Balashova S.A.

_____	_____	_____
Position, BUP	Signature	Surname.

HEAD OF EDUCATIONAL
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**Head of the Department of
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_____	_____	_____
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