

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

Federal State Autonomous Educational Institution of Higher Education

“Ural Federal University named after the first President of Russia B.N. Yeltsin

APPROVED

Deputy Director of Education

administration and organization of university education activities

Avramenko E.S.

26 апреля 2021 г.



ENTRANCE TEST PROGRAM IN MAGISTRACY

The list of information about the program of entrance examinations to the «Data Science» Master's program	09.04.02. Information Systems and Technologies.
Own educational standard Ural Federal University in the field of education "Engineering, technology and technical sciences"	Decision of the Academic Council of Ural Federal University Protocol N2 9 of November 26, 2018 Approved by order of the rector of UrFU N21069 / 03 dated 12/28/2018

Yekaterinburg, 2021

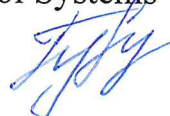
The program of entrance examinations to the magistracy compiled by the authors:

	Full name	Academic degree	Position	Department
1	Sozykin Andrey Vladimirovich	PhD	Head of the school	School of Professional and Academic Education
2	Borisov Vasilii Ilyich	PhD	Head of the Master's program	School of Professional and Academic Education

The program is approved:

Educational-Methodical Council of Engineering School of Information Technologies, Telecommunications and Control Systems

Head of Educational-Methodical Council



T.I. Alferieva

Director of Engineering School of Information Technologies,
Telecommunications and Control Systems



I.N. Obabkov

ANNOTATION:

The program is compiled in accordance with the requirements of the Independent Educational Educational Standard for the preparation of applicants for master's degree in 04.04.02 Information Systems and Technologies.

The exam is four-component, it is carried out in test form in accordance with the requirements of the Order of the rector of Ural Federal University N9221 / 03 of 03/07/2019 "On entrance examinations for master's programs."

The purpose of the entrance examinations is to provide persons applying for admission to the Ural Federal University for mastering the master's educational program with equal conditions, regardless of the previous document on higher education.

The task of entrance examinations is to identify the readiness of the applicant to study at the magistracy in terms of the formation of information and communication competence not lower than the basic level and knowledge of the main content of relevant disciplines.

CONTENTS OF ENTRANCE TESTS IN THE MASTER DIRECTION
04.09.02 Information systems and technologies

CONTENT OF INTERVIEW

1. The main stages of a statistical study design.
2. Types of average values and methods for its calculation.
3. What are structural averages: mode and median? How are the calculation of mode and median?
4. What is dispersion? How is the calculation of the dispersion?
5. What is the standard deviation (SD)? How is the calculation of the standard deviation?
6. What are quartiles and interquartile range? How are its calculation?
7. What are type I and type II errors? How are their calculation?
8. The concept of correlation dependence, its difference from the functional. The main models of correlation dependence.
9. What is a time series? Give an example of a time series.
10. What are local and global minima? Does one analytically find a minimum of the time series?
11. What is a matrix? Basic operations on matrices.
12. What are vectors on the plane and in space (geometric vectors)? Linear operations on vectors (addition, multiplication of a vector by a number).
13. What is linear regression? Describe the application of the least squares method to solve the linear regression problem.
14. Bayes theorem and its application.
15. What is Normal distribution? Its key parameters. The law of large numbers (LLN).

16. What is data normalization and scaling? Describe the process of scaling and normalizing data.
17. What are emissions and extreme data? Describe the mathematical apparatus of their definition.
18. What are the key data types that may be in data mining tasks.
19. What are the tasks that can be solved when teaching machine learning models with a teacher. Give examples of such tasks.
20. What are the tasks that can be solved when teaching machine learning models without a teacher. Give examples of such tasks.