



National Research University Higher School of Economics (HSE)

Curriculum

Field of study 01.03.02 Applied Mathematics and Information Science

Educational Programme "Applied Mathematics and Information Science"

Specializations: "Choice and Decision Theory", "Data Analysis and Intelligent Systems", "Distributed Systems", "Industrial Software Engineering", "Machine Learning and Applications", "Theoretical Computer Science"

Implementing unit: Faculty of Computer Science, HSE - Moscow
3 rd, 2024/2025 academic year

APPROVED

19.04.2024

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Length of Programme: 4 years

Years of Study: 2022/2023 - 2025/2026

Mode of Study: Full Time

Degree: Bachelor's degree

Block Code	Course	Subject type	Department	Credits	Total Academic Hours	Contact Hours	Allocation of Contact Hours				Additional Information
							1	2	3	4	
Degree Programme				60,00	2 280	538	94	126	160	160	
Data Culture				5,00	190	110		30	40	42	
1	Introduction to Deep Learning	E	Department of Big Data and Information Retrieval	4,00	152	10		6	4A		Online Course, Foreign language
2	External Examinations on Digital Skills. Final Level	C	отдел развития цифровых компетенций			2		2A			
3	Deep Learning 1	E	Department of Big Data and Information Retrieval	4,00	152	48		28	20A		Online Course, Foreign language
4	Data Science, AI and Generative Models Independent Test. Advanced Level	C	отдел развития цифровых компетенций	1,00	38	2				2A	Online Course
5	Service-Oriented Architectures	E	базовая кафедра Тинькофф	4,00	152	80			40	40A	Online Course, Foreign language
Major				38,00	1 444	272	56	56	80	80	
Core Professional Block (Major)				6,00	228	80			40	40	
Методы оптимизации				6,00	228	80			40	40	
1	Combinatorial Optimization	E	Joint Department with Yandex	6,00	228	80			40	40A	
2	Optimization Methods	E	Joint Department of Mathematical Methods in System Analysis with RAS Institute of System Analysis	6,00	228	80			40	40A	Online Course
3	Optimization in Machine Learning	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	Online Course
Elective Professional Block (Major)				32,00	1 216	192	56	56	40	40	

Дисциплины по выбору (Блок 1)				5,00	190	56	28	28			
1	Computer Systems Security	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
2	Operating Systems 2	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
3	Foundations of Tensor Computations	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
4	Applied Statistical Data Analysis	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
5	Decision Making under Risk and Uncertainty	E	Department of Mathematics	5,00	190	60	30	30A			
6	Developing Microservices with Golang	E	базовая кафедра МТС	5,00	190	56	28	28A			
7	Distributed Systems	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
8	Database Systems	E	Joint Department with Yandex	5,00	190	56	28	28A			
9	Statistical Learning Theory	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			Foreign language
10	Types and Programming Languages	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
11	Functional Programming	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
12	SQL Language	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
13	Scala Programming Language	E	базовая кафедра Тинькофф	5,00	190	56	28	28A			
Дисциплины по выбору (Блок 2)				6,00	228	80			40	40	
1	Data Analytics	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Generative Models in Machine Learning (advanced course)	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
3	Deep Learning Methods in Natural Sciences	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
4	Quantitative Finance	E	базовая кафедра ПАО Сбербанк "Финансовые технологии и анализ данных"	6,00	228	80			40	40A	
5	Combinatorial Optimization	E	Joint Department with Yandex	6,00	228	80			40	40A	
6	Computer Networks	E	базовая кафедра Тинькофф	6,00	228	80			40	40A	
7	Machine Learning 2	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
8	Machine learning in applied problems	E	базовая кафедра МТС	6,00	228	80			40	40A	
9	Time Series Modeling	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
10	Java Programming	E	Joint Department with Yandex	6,00	228	80			40	40A	
11	Process-mining	E	базовая кафедра ПАО Сбербанк "Финансовые технологии и анализ данных"	6,00	228	80			40	40A	
12	Recommender Systems	E	базовая кафедра Тинькофф	6,00	228	80			40	40A	

13	Stochastic Calculus	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
14	Topological data analysis	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
Обязательная дисциплина на 3 курсе				6,00	228	56	28	28			
1	Machine Learning 1	C	Department of Big Data and Information Retrieval	6,00	228	56	28	28A			Online Course
Специализации				15,00	570						
Специализация "Анализ данных и интеллектуальные системы"				15,00	570	212	42	48	62	60	
1	Combinatorics, Graphs and Logic	C	Department of Data Analysis and Artificial Intelligence	6,00	228	80			40	40A	Foreign language
2	Research Seminar "Data Analysis and Artificial Intelligence"	C	Department of Data Analysis and Artificial Intelligence	4,00	152	72	14	16	22	20A	Foreign language
3	Core Concepts in Data Analysis	C	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A			
Специализация "Анализ и принятие решений"				15,00	570	212	42	48	62	60	
1	Operations Research and Game Theory	C	Department of Mathematics	6,00	228	80			40	40A	Foreign language
2	Research Seminar "Applied Problems of Decision Making"	C	Department of Mathematics	4,00	152	72	14	16	22	20A	
3	Choice and Decision Theory	C	Department of Mathematics	5,00	190	60	28	32A			Foreign language
Специализация "Машинное обучение и приложения"				15,00	570	204	42	42	60	60	
1	Machine Learning 2	C	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Research Seminar "Machine Learning and Applications"	C	Department of Big Data and Information Retrieval	4,00	152	68	14	14	20	20A	
3	Applied Statistical Data Analysis	C	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
-				15,00	570	204	42	42	60	60	
1	Fault-tolerant System Design	C	базовая кафедра Тинькофф	5,00	190	56	28	28A			
2	Fault-tolerant System Design 2	C	базовая кафедра Тинькофф	6,00	228	80			40	40A	
3	Project Seminar "Software Engineering"	C	Department of Big Data and Information Retrieval	4,00	152	68	14	14	20	20A	
Специализация "Распределенные системы"				15,00	570	204	42	42	60	60	
1	Research Seminar "Distributed Systems"	C	Department of Big Data and Information Retrieval	4,00	152	68	14	14	20	20A	
2	Distributed Systems	C	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
3	Theory and Practice of Concurrency	C	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
Специализация "Теоретическая информатика"				15,00	570	204	42	42	60	60	
1	Combinatorial Constructions in Theoretical Computer Science	C	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Research Seminar "Theoretical Informatics"	C	Department of Big Data and Information Retrieval	4,00	152	68	14	14	20	20A	
3	Theory of Computation	C	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			Foreign language
Minor				10,00	380	152	38	38	38	38	

1	Minor	E		10,00	380	152	38	38A	38	38A	
	English					2			2		
	Examinations					2			2		
1	Independent English Exam	C	School of Foreign Languages			2			2A		Foreign language
	Internship			7,00	266	2		2			
	Project Internship			5,00	190	2		2			
1	-	C		5,00	190	2		2	2	2	
	Professional Internship			2,00	76						
1	Work Experience Internship	C		2,00	76						

Curriculum agreed:

Academic Supervisor SOKOLOV E.A. 04.04.2024

Dean ARZHANTSEV I.V. 04.04.2024

Head of Centre for Educational Model Design LEPESHKIN I.A. 19.04.2024

* Subject type:

Compulsory course

C

Elective course

E

Optional course

O