



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: "Data Analysis and Intelligent Systems", "Decision Choice and Analysis", "Distributed Systems", "Industrial Software Engineering", "Machine Learning and Applications", "Mathematical and Computational Engineering in Science and Business", "Theoretical Computer Science"

Implementing unit: Faculty of Computer Science, HSE - Moscow
3 rd, 2023/2024 academic year

APPROVED

10.05.2023

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Length of Programme: 4 years

Years of Study: 2021/2022 - 2024/2025

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	762	190	166	243	218	
Data Culture				5,00	190	128		28	62	40	
1	Introduction to Deep Learning	E	Department of Big Data and Information Retrieval	4,00	152	10		6	4A		Online Course, Foreign language
2	Deep Learning 1	E	Department of Big Data and Information Retrieval	4,00	152	48		28	20A		Online Course, Foreign language
3	Independent Data Science Test. Advanced Level	C	отдел развития цифровых компетенций	1,00	38	2			2A		Online Course
4	Service-Oriented Architectures	E	базовая кафедра Тинькофф	4,00	152	80			40	40A	Online Course, Foreign language
Major				38,00	1 444	476	150	98	140	140	
Core Professional Block (Major)				6,00	228	80	52		40	40	
Subject Areas				6,00	228	80	52		40	40	
Optimization Methods				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	396	98	98	100	100	
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	Bioinformatics	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
3	Operating Systems 2	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
4	Foundations of Tensor Computations	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
5	Applied Statistical Data Analysis	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
6	Decision Making under Risk and Uncertainty	E	Department of Mathematics	5,00	190	60	30	30A			
7	Developing Microservices with Golang	E	базовая кафедра МТС	5,00	190	56	28	28A			
8	Distributed Systems	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
9	Data Collection and Labeling for Machine Learning	E	Joint Department with Yandex	5,00	190	56	28	28A			
10	Database Systems	E	базовая кафедра Тинькофф	5,00	190	56	28	28A			
11	Statistical Learning Theory	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			Foreign language
12	Types and Programming Languages	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
13	Data management in intelligent systems	E	Department of Data Analysis and Artificial Intelligence	5,00	190	64	32	32A			Foreign language
14	Management Consulting For Business: Basic Skills, Industry and Functional Expertise	E	Базовая кафедра «Яков и Партнёры»	5,00	190	42	28	14A			
15	Functional Programming	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
16	SQL Language	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
17	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	Color Computational Photography	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Data Analysis in Business	E	Department of Big Data and Information Retrieval	6,00	228	80			40A	40A	
3	Data Analytics	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
4	Generative Models in Machine Learning (advanced course)	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
5	Deep Learning Methods in Natural Sciences	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
6	Chapters in Applied Statistics	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	

7	Quantitative Finance	E	базовая кафедра ПАО Сбербанк "Финансовые технологии и анализ данных"	6,00	228	80			40	40A	
8	Combinatorial Optimization	E	Joint Department with Yandex	6,00	228	80			40	40A	
9	Computer Networks	E	базовая кафедра Тинькофф	6,00	228	80			40	40A	
10	Linguistics for Programmers	E	School of Linguistics	6,00	228	68			36	32A	
11	Machine Learning 2	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
12	Machine learning in applied problems	E	базовая кафедра МТС	6,00	228	80			40	40A	
13	Time Series Modeling	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
14	Java Programming	E	Joint Department with Yandex	6,00	228	80			40	40A	
15	Process-mining	E	базовая кафедра ПАО Сбербанк "Финансовые технологии и анализ данных"	6,00	228	80			40	40A	
16	Recommender Systems	E	базовая кафедра Тинькофф	6,00	228	80			40	40A	
17	Stochastic Calculus	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
18	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	204	42	42	60	60	
Специализация "Анализ данных и интеллектуальные системы"				15,00	570	212	42	48	62	60	
1	Combinatorics, Graphs and Boolean 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 "Математическая инженерия в науке и бизнесе"				15,00	570	204	42	42	60	60	
1	Research Seminar "Mathematical and Computational Engineering in Science and Business"	C	Department of Big Data and Information Retrieval	4,00	152	68	14	14	20	20A	Foreign language
2	Applied Differential Equations and Numerical Methods	C	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
3	Control Theory and Foundations of Robotics	C	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
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 Examinations							2			3	
Examinations							2			3	
1	Independent English Exam	C	School of Foreign Languages				2		2A		Foreign language
Internship				7,00	266	4	2	2			
Project Internship				5,00	190	2		2			
1	-	C		5,00	190	2		2	2	2	
Professional Internship				2,00	76	2	2				
1	Work Experience Internship	C		1,00	38						
2	Educational Internship	C		1,00	38	2	2A				

Curriculum agreed:

Academic Supervisor SOKOLOV E.A. 03.05.2023

Dean ARZHANTSEV I.V. 05.05.2023

Head of Centre for Educational Model Design LEPESHKIN I.A. 09.05.2023

* Subject type:

Compulsory course

Elective course

Optional course

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