



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
4 th, 2023/2024 academic year

APPROVED

03.04.2023

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Length of Programme: 4 years

Years of Study: 2020/2021 - 2023/2024

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				23,00	874	40	114	114	156	6	
Major							98	98	154		
Elective Professional Block (Major)							98	98	154		
Дисциплины по выбору (Блок 3)				10,00	380	112	56	56			
1	Bayesian Methods for Machine Learning	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
2	Computer Systems Security	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
3	Deep Learning for Graph Data Analysis	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
4	Deep Learning for Sound Processing	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
5	Deep Learning for Natural Language Processing	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
6	Systems Design	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			
7	Cooperative and Noncooperative Decision Making	E	Department of Mathematics	5,00	190	60	28	32A			Foreign language
8	Methods and Systems for Processing Big Data	E	базовая кафедра МТС	5,00	190	56	28	28A			
9	Operating Systems 2	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A			

10	Foundations of Tensor Computations	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		
11	Applied Graph Theory	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A		Foreign language
12	Decision Making under Risk and Uncertainty	E	Department of Mathematics	5,00	190	60	30	30A		
13	Data Collection and Labeling for Machine Learning	E	Joint Department with Yandex	5,00	190	56	28	28A		
14	Complex Systems Theory	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A		
15	Statistical Learning Theory	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		Foreign language
16	Types and Programming Languages	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		
17	Management Consulting Ffor Business: Basic Skills, Industry and Functional Expertise	E	Базовая кафедра «Яков и Партнёры»	5,00	190	42	28	14A		
18	Systems Reliability Engineering	E	базовая кафедра Тинькофф	5,00	190	56	28	28A		
19	Scala Programming Language	E	базовая кафедра Тинькофф	5,00	190	56	28	28A		
Дисциплины по выбору (Блок 4)				8,00	304	80			80	
1	Analysis and Visualization of Networks	E	Department of Data Analysis and Artificial Intelligence	4,00	152	44			44A	Foreign language
2	Introduction to Blockchain	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
3	Introduction to Data Platforms	E	базовая кафедра МТС	4,00	152	40			40A	
4	Generative Models in Machine Learning	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
5	Decentralized Systems	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
6	Advanced Chapters in Decision Theory».	E	Department of Mathematics	4,00	152	46			46A	Foreign language
7	Information Security	E	базовая кафедра Тинькофф	4,00	152	40			40A	
8	Conflict and Cooperation	E	Department of Mathematics	4,00	152	46			46A	Foreign language
9	Self-supervised Learning	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
10	Media Data Compression and Distribution	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	Online Course
11	Reinforcement Learning	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
12	Design and Engineering of Recommender Systems	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
13	Industrial Programming in Haskell	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
14	Symbolic Computation	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
15	Theory and Practice of Online Experiments	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
16	3D Computer Vision	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	

17	Efficient Deep Learning Systems	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
Обязательная дисциплина по выбору (4 курс)				5,00	190	14			14	
1	DevOps	E	базовая кафедра МТС	5,00	190	28			28A	Online Course, Foreign language
2	Introduction to Differential Geometry	E	Department of Big Data and Information Retrieval	5,00	190	40			40A	Online Course, Foreign language
3	How to Win a Data Science Competition: Learn from Top Kagglers	E	Department of Big Data and Information Retrieval	5,00	190	6			6A	Online Course, Foreign language
Специализации				14,00	532	144	42	42	60	
Специализация "Анализ данных и интеллектуальные системы"				14,00	532	156	42	48	66	
1	Automatic Text Processing	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A		
2	Research Seminar "Data Analysis and Artificial Intelligence 2"	E	Department of Data Analysis and Artificial Intelligence	5,00	190	52	14	16	22A	Foreign language
3	Semantic Technologies	E	Department of Data Analysis and Artificial Intelligence	4,00	152	44			44A	Foreign language
Специализация "Анализ и принятие решений"				14,00	532	158	14	16	128	
1	Time Series and Stochastic Processes	E	Department of Mathematics	4,00	152	46			46A	Foreign language
2	Research Seminar "Applied Problems of Decision Making 2"	E	Department of Mathematics	5,00	190	52	14	16	22A	
3	Systems Analysis	E	Department of Mathematics	5,00	190	60			60A	Foreign language
Специализация "Математическая инженерия в науке и бизнесе"				14,00	532	148	42	46	60	
1	Research Seminar "Mathematical and Computational Engineering in Science and Business 2"	E	Department of Big Data and Information Retrieval	5,00	190	48	14	14	20A	Foreign language
2	Stochastic Processes	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
3	Complex Systems Theory	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A		
Специализация "Машинное обучение и приложения"				14,00	532	144	42	42	60	
1	Deep Learning 2	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		
2	Large-Scale Machine Learning	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	Online Course
3	Research Seminar "Machine Learning and Applications 2"	E	Department of Big Data and Information Retrieval	5,00	190	48	14	14	20A	
-				14,00	532	144	42	42	60	
1	Project Seminar "Software Engineering 2"	E	Department of Big Data and Information Retrieval	5,00	190	48	14	14	20A	
2	Systems Reliability Engineering	E	базовая кафедра Тинькофф	5,00	190	56	28	28A		
3	Systems Reliability Engineering 2	E	базовая кафедра Тинькофф	4,00	152	40			40A	
Специализация "Распределенные системы"				14,00	532	144	42	42	60	
1	Research Seminar "Distributed Systems 2"	E	Department of Big Data and Information Retrieval	5,00	190	48	14	14	20A	

2	Cloud Computing	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
3	Theory of Fault-Tolerant Distributed Systems	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		
Специализация "Теоретическая информатика"				14,00	532	144	42	42	60	
1	Convex Programming and Approximation Algorithms	E	Department of Big Data and Information Retrieval	4,00	152	40			40A	
2	Research Seminar "Theoretical Informatics 2"	E	Department of Big Data and Information Retrieval	5,00	190	48	14	14	20A	
3	One-Way Functions and Their Applications	E	Department of Big Data and Information Retrieval	5,00	190	56	28	28A		
English				1,00	38	2			2	
Optional Courses										
1	Academic English Writing	O		2,00	76	48		28	20A	Foreign language, Credits only to the cumulative rating
Examinations				1,00	38	2			2	
1	Project Proposal	C	School of Foreign Languages	1,00	38	2			2A	Foreign language
Final State Certification (FSC)				3,00	114	2				2
Thesis Work				3,00	114	2				2
1	Presenting of Graduation Thesis	C		3,00	114	2				2A
General Courses				4,00	152	30	14	16		
Optional General Courses				4,00	152	30	14	16		
1	Psychology	C	Department of Psychology	4,00	152	30	14	16A		Online Course
Internship				15,00	570	6	2			4
Research Internship				15,00	570	4				4
1	Preparation of Graduation Thesis	C		9,00	342	2				2
2	Graduation Internship	C		6,00	228	2				2A
Professional Internship						2	2			
1	Work Experience Internship	C				2	2A			

Curriculum agreed:

Academic Supervisor	SOKOLOV E.A.	31.03.2023
Dean	ARZHANTSEV I.V.	31.03.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	03.04.2023

* Subject type:

Compulsory course

C

Elective course

E

Optional course

O