



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, 2022/2023 academic year

APPROVED

06.05.2022

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	
<b>Degree Programme</b>				<b>60,00</b>	<b>1 254</b>	<b>648</b>	<b>784</b>	<b>872</b>	<b>1 052</b>	<b>1 014</b>	
<b>Data Culture</b>				<b>4,00</b>	<b>152</b>						
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	52	16	18	18A		Online Course, Foreign language
3	Service-Oriented Architectures	E	Department of Big Data and Information Retrieval	4,00	152	80			40	40A	Online Course, Foreign language
<b>Major</b>				<b>6,00</b>		<b>80</b>	<b>744</b>	<b>826</b>	<b>970</b>	<b>936</b>	
<b>Core Professional Block (Major)</b>				<b>6,00</b>		<b>80</b>			<b>72</b>	<b>68</b>	
<b>Subject Areas</b>				<b>6,00</b>		<b>80</b>			<b>72</b>	<b>68</b>	
<b>Optimization Methods</b>				<b>6,00</b>		<b>80</b>			<b>40</b>	<b>40</b>	
1	Optimization Methods	E	Joint Department of Mathematical Methods in System Analysis with RAS Institute of System Analysis	6,00	228	60			32	28A	Online Course
2	Optimization in Machine Learning	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	Online Course
<b>Elective Professional Block (Major)</b>							<b>744</b>	<b>826</b>	<b>898</b>	<b>868</b>	
<b>Дисциплины по выбору (Блок 1)</b>				<b>5,00</b>		<b>60</b>	<b>28</b>	<b>32</b>			
1	Computer Systems Security	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			

2	Bioinformatics	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
3	Computer Networks	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
4	Mathematical Logic	E	Department of Big Data and Information Retrieval	5,00	190	56	24	32A			
5	Foundations of Tensor Computations	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
6	Applied Statistical Data Analysis	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
7	Decision Making under Risk and Uncertainty	E	Department of Mathematics	5,00	190	60	30	30A			
8	Developing Microservices with Golang	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
9	Distributed Systems	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
10	Data Collection and Labeling for Machine Learning	E	Joint Department with Yandex	5,00	190	60	28	32A			
11	Statistical Learning Theory	E	Department of Big Data and Information Retrieval	5,00	190	54	28	26A			Foreign language
12	Number Theory and Cryptography	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
13	Data management in intelligent systems	E	Department of Data Analysis and Artificial Intelligence	5,00	190	64	32	32A			Foreign language
14	Functional Programming	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A			
15	SQL Language	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
<b>Дисциплины по выбору (Блок 2)</b>				<b>6,00</b>		<b>80</b>			<b>40</b>	<b>40</b>	
1	Data Analysis in Business	E	базовая кафедра компании SAS	6,00	228	64			44A	20A	
2	Chapters in Applied Statistics	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
3	Quantitative Finance: Derivatives Pricing, Risk Management and Trading	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
4	Combinatorial Optimization	E	Joint Department with Yandex	6,00	228	80			40	40A	
5	Machine Learning 2	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
6	Modern Coding Theory	E	Department of Complex Systems Modelling Technologies	6,00	228	80			40	40A	
7	Time Series Modeling	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
8	Product Analytics	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
9	Java Programming	E	Joint Department with Yandex	6,00	228	80			40	40A	
10	Database Systems	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	

11	Topological data analysis	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
12	Numerical Methods	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
<b>Обязательная дисциплина на 3 курсе</b>				<b>6,00</b>	<b>228</b>	<b>60</b>	<b>28</b>	<b>32</b>			
1	Machine Learning 1	C	Department of Big Data and Information Retrieval	6,00	228	60	28	32A			Online Course
<b>Специализации</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>294</b>	<b>322</b>	<b>434</b>	<b>420</b>	
<b>Специализация "Анализ данных и интеллектуальные системы"</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Combinatorics, Graphs and Boolean Logic	E	Department of Data Analysis and Artificial Intelligence	6,00	228	80			40	40A	Foreign language
2	Research Seminar "Data Analysis and Artificial Intelligence"	E	Department of Data Analysis and Artificial Intelligence	4,00	152	72	14	16	22	20A	Foreign language
3	Core Concepts in Data Analysis	E	Department of Data Analysis and Artificial Intelligence	5,00	190	60	28	32A			
<b>Специализация "Анализ и принятие решений"</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Operations Research and Game Theory	E	Department of Mathematics	6,00	228	80			40	40A	Foreign language
2	Research Seminar "Applied Problems of Decision Making"	E	Department of Mathematics	4,00	152	72	14	16	22	20A	
3	Choice and Decision Theory	E	Department of Mathematics	5,00	190	60	28	32A			Foreign language
<b>Специализация "Математическая инженерия в науке и бизнесе"</b>				<b>15,00</b>	<b>570</b>	<b>198</b>	<b>42</b>	<b>34</b>	<b>62</b>	<b>60</b>	
1	Mathematical Modeling	E	Department of Big Data and Information Retrieval	5,00	190	46	28	18A			
2	Research Seminar "Mathematical and Computational Engineering in Science and Business"	E	Department of Big Data and Information Retrieval	4,00	152	72	14	16	22	20A	Foreign language
3	Partial Differential Equations	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
<b>Специализация "Машинное обучение и приложения"</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Machine Learning 2	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Research Seminar "Machine Learning and Applications"	E	Department of Big Data and Information Retrieval	4,00	152	72	14	16	22	20A	
3	Applied Statistical Data Analysis	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Fault-tolerant System Design	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
2	Fault-tolerant System Design 2	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
3	Project Seminar "Software Engineering"	E	Department of Big Data and Information Retrieval	4,00	152	72	14	16	22	20A	
<b>Специализация "Распределенные системы"</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Research Seminar "Distributed Systems"	E	Department of Big Data and Information Retrieval	4,00	152	72	14	16	22	20A	

2	Distributed Systems	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			
3	Theory and Practice of Concurrency	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
<b>Специализация "Теоретическая информатика"</b>				<b>15,00</b>	<b>570</b>	<b>212</b>	<b>42</b>	<b>48</b>	<b>62</b>	<b>60</b>	
1	Combinatorial Constructions in Theoretical Computer Science	E	Department of Big Data and Information Retrieval	6,00	228	80			40	40A	
2	Research Seminar "Theoretical Informatics"	E	Department of Big Data and Information Retrieval	4,00	152	72	14	16	22	20A	
3	Theory of Computation	E	Department of Big Data and Information Retrieval	5,00	190	60	28	32A			Foreign language
<b>Minor</b>				<b>10,00</b>		<b>152</b>	<b>38</b>	<b>38</b>	<b>38</b>	<b>38</b>	
1	Minor	E		10,00		152	38	38A	38	38A	
<b>English</b>											
<b>Examinations</b>											
1	Independent English Exam		School of Foreign Languages			3			3A		Foreign language
<b>Internship</b>				<b>8,00</b>	<b>304</b>	<b>4</b>	<b>2</b>	<b>2</b>			
<b>Project Internship</b>				<b>5,00</b>	<b>190</b>	<b>2</b>		<b>2</b>			
1	Term Project 2	C		5,00	190	2		2	2	2	
<b>Professional Internship</b>				<b>3,00</b>	<b>114</b>	<b>2</b>	<b>2</b>				
1	Work Experience Internship	C		2,00	76						
2	Educational Internship	C		1,00	38	2	2A				

**Curriculum agreed:**

Academic Supervisor SOKOLOV E.A. 06.05.2022

Dean ARZHANTSEV I.V. 06.05.2022

Head of Degree Programmes Development Office LEPESHKIN I.A. 06.05.2022

\* Subject type:

Compulsory course

C

Elective course

E

Optional course

O