



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 01.03.02 Applied Mathematics and Information Science

Educational Programme "Data Science and Business Analytics"

Specializations: "Data Analysis in Natural Sciences", "Data Science in Business", "Data Science in Finance"

Implementing unit: Faculty of Computer Science, HSE - Moscow

APPROVED
21.07.2023
Vice Rector
ROSHCHIN S.Y.
Signed with EDS

Years of Study: 2023/2024 - 2026/2027

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

Block Code	Course	Subject type	Credits	Credits by Years				Planned Educational Programme Development Results
				1	2	3	4	
	Degree Programme		240,00	60,00	60,00	60,00	60,00	
	Major		159,00	41,00	41,00	34,00	43,00	
	Core Professional Block (Major)		74,00	41,00	30,00	3,00		
	Core Professional Block (Major)		74,00	41,00	30,00	3,00		
1	Discrete Mathematics (offered in a foreign language)	C	7,00	7,00				GPC-1, GPC-2, PC-1, UC-1, UC-2
2	Algebra (offered in a foreign language)	C	4,00	4,00				GPC-1, PC-1, UC-1, UC-2
3	Optimization Methods (offered in a foreign language)	C	3,00			3,00		GPC-1, GPC-3, PC-1, PC-2, UC-1, UC-2
4	Calculus 2 (offered in a foreign language)	C	4,00		4,00			GPC-1, GPC-2, GPC-3, PC-1, UC-1, UC-2
5	Discrete Mathematics 2 (offered in a foreign language)	C	4,00		4,00			GPC-1, GPC-2, GPC-3, PC-1, UC-1, UC-2, UC-3
6	Probability Theory and Mathematical Statistics (offered in a foreign language)	C	8,00		8,00			GPC-1, GPC-3, PC-1, UC-1, UC-2
7	Computer Architecture and Operating Systems (offered in a foreign language)	C	4,00		4,00			GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-3, UC-1, UC-2
8	Python Programming (offered in a foreign language)	C	4,00	4,00				GPC-2, GPC-4, GPC-5, PC-2, PC-3, PC-7, UC-1, UC-2
9	C++ Programming Language (offered in a foreign language)	C	6,00	6,00				GPC-2, GPC-4, GPC-5, PC-2, PC-3, PC-7, UC-1, UC-2
10	Algorithms and Data Structures (offered in a foreign language)	C	5,00		5,00			GPC-2, GPC-3, GPC-4, GPC-5, PC-2, PC-3, PC-7, UC-1, UC-2
11	Algorithms and Data Structures 2 (offered in a foreign language)	C	5,00		5,00			GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-3, PC-7, UC-1, UC-2
12	Linear Algebra and Geometry (offered in a foreign language)	C	10,00	10,00				GPC-1, GPC-3, PC-1, UC-1, UC-2

13	Calculus (offered in a foreign language)	C	10,00	10,00				GPC-1, GPC-2, GPC-3, PC-1, UC-1, UC-2
	Elective Professional Block (Major)		85,00		11,00	31,00	43,00	
	Specializations		18,00			8,00	10,00	
	Educational track "Data Science in Business"		18,00			8,00	10,00	
1	Data Analysis in Business (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, UC-1
2	Research Seminar "Data Analysis in R" (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, PC-4, PC-5, UC-1, UC-3, UC-4
3	Research Seminar "Risk-Management in Banking" (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, PC-1, PC-4, PC-5, UC-1, UC-3, UC-9
4	Core Management Concepts (offered in a foreign language)	C	6,00				6,00	GPC-3, UC-3, UC-6, UC-9
	Educational track "Data Science in Finance"		18,00			8,00	10,00	
1	Research Seminar "Data Science in Financial Economics" (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, PC-4, PC-5, UC-1, UC-3, UC-4, UC-6, UC-9
2	Investment Management for Business (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-7, UC-1, UC-11, UC-3, UC-9
3	Asset Pricing and Financial Markets (offered in a foreign language)	C	6,00				6,00	GPC-1, GPC-3, PC-1, UC-1, UC-9
4	Research Seminar "Data Science in Financial Markets" (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, PC-1, PC-4, PC-5, UC-1, UC-3, UC-4, UC-6, UC-9
	Educational track "Data Analysis in Natural Sciences"		18,00			8,00	10,00	
1	Research Seminar "Data Science in scientific" (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, PC-7, UC-1, UC-3, UC-4
2	Research Seminar "Data analysis in complex systems" (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, PC-1, UC-1, UC-11, UC-3, UC-4
3	Operations Research and Game Theory (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, UC-1
4	Applied Statistics in Bioinformatics (offered in a foreign language)	C	6,00				6,00	GPC-1, GPC-3, PC-1, UC-1, UC-11
	Compulsory Courses		45,00		11,00	16,00	18,00	
1	Data Bases (offered in a foreign language)	C	4,00			4,00		GPC-2, GPC-5, PC-2, PC-3, UC-1, UC-2
2	Differential Equations (offered in a foreign language)	C	4,00		4,00			GPC-1, GPC-3, PC-1, UC-1
3	Introduction to Micro and Macroeconomics (offered in a foreign language)	C	7,00		7,00			GPC-1, PC-5, UC-1, UC-10, UC-11, UC-9
4	Stochastic processes and applications (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, UC-1
5	Time Series Analysis (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-3, PC-1, UC-1, UC-2
6	Business analytics, applied modelling and prediction (offered in a foreign language)	C	4,00			4,00		GPC-1, GPC-4, PC-1, PC-7, UC-1, UC-2, UC-3, UC-9
7	Machine Learning 2 (offered in a foreign language)	C	5,00				5,00	GPC-2, GPC-4, GPC-5, PC-2, PC-3, PC-7, UC-1, UC-2
8	Statistical Methods for Market Research (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, PC-1, UC-1, UC-2

9	Game Theory and Industrial Organization (offered in a foreign language)	C	5,00				5,00	GPC-1, GPC-3, PC-1, PC-7, UC-1
10	Game Theory and Strategic Management (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, PC-1, UC-1, UC-11, UC-3
	Elective Courses		22,00			7,00	15,00	
	Elective Courses (Block 1)		3,00			3,00		
1	Introduction to Statistical Learning (offered in a foreign language)	E	3,00			3,00		GPC-2, GPC-5, PC-2, PC-7, UC-1
2	Fundamentals of Statistical Learning (offered in a foreign language)	E	3,00			3,00		GPC-1, PC-1, PC-2, PC-3, UC-1
	Elective Courses (Block 2)		4,00			4,00		
1	Financial Engineering (offered in a foreign language)	E	4,00			4,00		GPC-1, GPC-3, PC-1, UC-1, UC-9
2	Financial Economics (offered in a foreign language)	E	4,00			4,00		GPC-3, PC-2, UC-10, UC-11, UC-9
	Elective Courses (Block 1)		3,00				3,00	
1	Philosophy of Artificial Intelligence (offered in a foreign language)	E	3,00				3,00	GPC-1, PC-6, UC-3, UC-5
2	Introduction to the Study of Language for Computer Scientists (offered in a foreign language)	E	3,00				3,00	PC-4, UC-11, UC-3
	Elective Courses (Block 2)		4,00				4,00	
1	Quantitative Finance (offered in a foreign language)	E	4,00				4,00	GPC-1, GPC-3, PC-1, UC-1, UC-9
2	Systems Analysis (offered in a foreign language)	E	4,00				4,00	GPC-1, GPC-3, PC-1, UC-1, UC-11
	Elective Courses (Block 3)		5,00				5,00	
1	Generative Models in Machine Learning (offered in a foreign language)	E	5,00				5,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, UC-1
2	How to Win a Data Science Competition: Learn from Top Kagglers (offered in a foreign language)	E	5,00				5,00	GPC-1, GPC-2, GPC-3, UC-1, UC-2
	Elective Courses (Block 4)		4,00				4,00	
1	Information Systems (offered in a foreign language)	E	4,00				4,00	GPC-1, GPC-2, PC-2, UC-1
2	Computer Vision (offered in a foreign language)	E	4,00				4,00	GPC-1, GPC-2, PC-1, UC-1
	Internship		30,00		8,00	8,00	14,00	
	Professional Internship		6,00		3,00	3,00		
1	Educational Internship (offered in a foreign language)	C	3,00		3,00			GPC-1, GPC-3, GPC-4, PC-1, PC-4, PC-7, UC-1, UC-11, UC-3, UC-4, UC-5, UC-6, UC-8
2	Work Experience Internship (offered in a foreign language)	C	3,00			3,00		GPC-1, GPC-4, PC-1, PC-7, UC-1, UC-11, UC-3, UC-4, UC-5, UC-6, UC-8
	Project Internship		10,00		5,00	5,00		
1	Programming Project (offered in a foreign language)	C	5,00		5,00			GPC-1, GPC-2, GPC-3, GPC-5, PC-1, PC-6, PC-7, UC-1, UC-3

2	Term paper (offered in a foreign language)	C	5,00			5,00		GPC-1, GPC-3, GPC-4, PC-1, PC-3, PC-6, PC-7, UC-1, UC-3
	Research Internship		14,00				14,00	
1	Preparation of Graduation Thesis (offered in a foreign language)	C	8,00				8,00	GPC-1, GPC-3, PC-1, PC-3, PC-7, UC-1, UC-3, UC-4
2	Graduation Internship (offered in a foreign language)	C	6,00				6,00	GPC-1, PC-1, PC-4, PC-5, UC-1, UC-11, UC-3, UC-4, UC-6
	General Courses		14,00	9,00	1,00	4,00		
	Core General Courses		2,00	1,00	1,00			
1	Safe Living Basics (offered in a foreign language)	C	1,00	1,00				PC-4, UC-6, UC-8
2	Physical Training (offered in a foreign language)	C	1,00		1,00			UC-7, UC-8
	Optional General Courses		12,00	8,00		4,00		
1	Russian History (offered in a foreign language)	C	4,00			4,00		GPC-4, UC-10, UC-3, UC-5
2	Economics (offered in a foreign language)	C	3,00	3,00				GPC-4, UC-11, UC-9
3	Law (offered in a foreign language)	C	3,00	3,00				GPC-4, PC-6, UC-10, UC-2
4	Foundations of Russian Statehood (offered in a foreign language)	C	2,00	2,00				GPC-4, UC-10, UC-3, UC-5
	Minor		20,00		10,00	10,00		
	Minor "Business and Management"		20,00		10,00	10,00		
1	Business and Management in Global Context 1 (offered in a foreign language)	E	5,00		5,00			GPC-1, PC-1, PC-6, PC-7, UC-11, UC-3, UC-5, UC-9
2	Business and Management in Global Context 2 (offered in a foreign language)	E	5,00		5,00			GPC-1, PC-6, PC-7, UC-11, UC-3, UC-5, UC-9
3	Entrepreneurship (offered in a foreign language)	E	5,00			5,00		GPC-4, PC-7, UC-11, UC-9
4	Management Information Systems and Technology (offered in a foreign language)	E	5,00			5,00		GPC-1, GPC-4, PC-6, PC-7, UC-1, UC-3
	Flexible minor		20,00		10,00	10,00		
1	Minor (offered in a foreign language)	E	20,00		10,00	10,00		PC-6, UC-1, UC-2, UC-3, UC-5, UC-6
	Minor "Applied Economics and Finance"		20,00		10,00	10,00		
1	History of Economic Thought (offered in a foreign language)	E	5,00		5,00			PC-6, UC-5, UC-9
2	Introduction in Finance (offered in a foreign language)	E	5,00		5,00			GPC-3, PC-6, UC-1, UC-9
3	Econometrics 1 (offered in a foreign language)	E	5,00			5,00		GPC-3, PC-1, UC-1, UC-9
4	Econometrics 2 (offered in a foreign language)	E	5,00			5,00		GPC-3, PC-1, UC-1, UC-9
	English		10,00	10,00				
	Examinations		10,00	10,00				
1	Independent English Exam (offered in a foreign language)	C						UC-3, UC-4
2	English Language (offered in a foreign language)	C	10,00	10,00				PC-4, PC-6, UC-4
	Data Culture		4,00			4,00		
1	Independent Digital Literacy Test (offered in a foreign language)	C						GPC-2, PC-3, UC-11
2	Independent Programming Test. Advanced Level (offered in a foreign language)	C						GPC-2, PC-3, UC-1

3	Independent Data Science Test. Advanced Level (offered in a foreign language)	C	1,00			1,00		GPC-1, GPC-3, PC-1, UC-1
4	Deep Learning (offered in a foreign language)	C	3,00			3,00		GPC-1, GPC-2, GPC-3, GPC-5, PC-1, PC-2, UC-1, UC-2
	Final State Certification (FSC)		3,00				3,00	
	Thesis Work		3,00				3,00	
1	Presenting of Graduation Thesis (offered in a foreign language)	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, UC-1, UC-11, UC-2, UC-3, UC-4, UC-5, UC-6, UC-9
	State Examinations							

Curriculum agreed:

Academic Supervisor	VOZNESENSKAYA T.V.	19.07.2023
Dean	ARZHANTSEV I.V.	19.07.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	21.07.2023

* Subject type:

Compulsory course	C
Elective course	E