



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 01.04.02 Applied Mathematics and Informatics  
 Educational Programme "Modern Computer Science"  
 Trajectories: "Artificial Intelligence", "Theoretical Computer Science"  
 Implementing unit: Faculty of Computer Science, HSE - Moscow

APPROVED  
 15.04.2024  
 Vice Rector  
 ROSHCHIN S.Y.  
 Signed with EDS

Years of Study: 2024/2025 - 2025/2026

Length of Programme: 2 years

Mode of Study: Full Time

Degree: Master's degree / MBA

Block Code	Course	Subject type	Credits	Credits by Years		Planned Educational Programme Development Results
				1	2	
	Degree Programme		120,00	60,00	60,00	
	Artificial Intelligence (General track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	
1	Mentor's Seminar "Artificial Intelligence"	C	15,00	6,00	9,00	GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		24,00	3,00	21,00	
	Project Internship		3,00	3,00		
1	Project	C	3,00	3,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Research Internship		21,00		21,00	
1	Graduation Thesis	C	21,00		21,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Major		63,00	45,00	18,00	
	1st year		45,00	45,00		
1	Algorithms in External Memory	E	6,00	6,00		GPC-2.AMI, PC-12, PC-8, UC-2
2	Algorithms and Data Structures 1	E	6,00	6,00		GPC-4.AMI, PC-11, UC-2
3	Deep Vision and Graphics	E	6,00	6,00		GPC-1.AMI, PC-10, PC-6, UC-2

4	C++ Programming Language 1	E	6,00	6,00		GPC-4.AMI, PC-10, PC-2, UC-6
5	Python	E	6,00	6,00		GPC-4.AMI, PC-10, PC-2, UC-2
6	Computer Architecture and Operating Systems	E	6,00	6,00		GPC-3.AMI, PC-4, PC-9, UC-1
7	Machine Learning 1	E	6,00	6,00		GPC-2.AMI, PC-2, PC-5, PC-7, UC-2
8	Data Collection and Labeling for Machine Learning	E	3,00	3,00		GPC-2.AMI, PC-5, PC-6, PC-8, UC-2
9	Generative Models in Machine Learning	E	3,00	3,00		GPC-1.AMI, PC-5, PC-7, UC-1
10	Transformers and LLMs	E	3,00	3,00		GPC-3.AMI, PC-4, PC-5, PC-7, UC-2
11	Algorithms and Data Structures 2	E	6,00	6,00		GPC-1.AMI, PC-10, UC-2
12	Machine Learning 2	E	6,00	6,00		GPC-1.AMI, PC-5, UC-2
13	Reinforcement Learning	E	6,00	6,00		GPC-4.AMI, PC-4, PC-5, PC-7, UC-2
14	Learning C++ 2	E	6,00	6,00		GPC-4.AMI, PC-12, UC-2
15	Efficient Deep Learning Systems	E	6,00	6,00		GPC-4.AMI, PC-12, PC-3, PC-7, UC-2
16	Speech Technologies	E	6,00	6,00		GPC-4.AMI, PC-9, UC-2
17	Graphs in Machine Learning	E	6,00	6,00		GPC-1.AMI, PC-5, PC-6, UC-1
18	Recommender Systems	E	3,00	3,00		GPC-4.AMI, PC-1, PC-11, PC-7, UC-4
19	Effective Machine Learning Models and Neural Network Architectures	E	3,00	3,00		GPC-4.AMI, PC-12, PC-3, PC-7, UC-2
20	Machine Learning Systems Design	E	3,00	3,00		GPC-2.AMI, PC-4, PC-6, PC-9, UC-2
	2nd year		18,00		18,00	
1	Game Theory	E	6,00		6,00	GPC-2.AMI, PC-2, PC-7, UC-1
2	Bayesian Methods for Machine Learning	E	6,00		6,00	GPC-4.AMI, PC-5, PC-7, UC-2
3	Deep Learning for Graph Data Analysis	E	6,00		6,00	GPC-2.AMI, PC-6, PC-7, PC-8, UC-2
4	Natural Language Processing	E	6,00		6,00	GPC-2.AMI, PC-2, PC-3, PC-6, PC-7, UC-1
5	Computer Vision	E	6,00		6,00	GPC-2.AMI, PC-2, PC-6, PC-7, UC-4
6	Modern System Programming in Rust	E	6,00		6,00	GPC-4.AMI, PC-2, UC-2
7	Distributed Systems	E	6,00		6,00	GPC-1.AMI, PC-11, PC-6, PC-7, UC-2
8	Performance and Reliability of Distributed Systems	E	6,00		6,00	GPC-1.AMI, PC-11, PC-2, PC-7, UC-3
	Magolego		15,00	6,00	9,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	6,00	9,00	GPC-4.AMI, PC-5, UC-1, UC-5, UC-6
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Theoretical Computer Science (General track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	

1	Mentor's Seminar "Theoretical Informatics"	C	15,00	6,00	9,00	GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		24,00	3,00	21,00	
	Project Internship		3,00	3,00		
1	Project	C	3,00	3,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Research Internship		21,00		21,00	
1	Graduation Thesis	C	21,00		21,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Major		63,00	45,00	18,00	
	1st year		45,00	45,00		
1	Algorithmic Game Theory	E	6,00	6,00		GPC-2.AMI, PC-12, PC-5, UC-3
2	Algorithms and Data Structures 1	E	6,00	6,00		GPC-4.AMI, PC-11, UC-2
3	Theory of Computation	E	6,00	6,00		GPC-2.AMI, PC-14, UC-1
4	Types and Programming Languages	E	6,00	6,00		GPC-4.AMI, PC-14, PC-5, UC-1
5	Convex Analysis and Optimization	E	6,00	6,00		GPC-1.AMI, GPC-2.AMI, PC-1, PC-14, PC-5, UC-1
6	Game Theory	E	6,00	6,00		GPC-4.AMI, PC-7, UC-2
7	Industrial Programming in Haskell 1	E	3,00	3,00		GPC-4.AMI, PC-13, PC-2, UC-2
8	A Theorist's Toolkit	E	3,00	3,00		GPC-1.AMI, GPC-2.AMI, PC-14, UC-1
9	Algorithms and Data Structures 2	E	6,00	6,00		GPC-4.AMI, PC-11, UC-2
10	Combinatorial Constructions in Theoretical Computer Science	E	6,00	6,00		GPC-4.AMI, PC-14, UC-1
11	Fundamentals of Matrix Computations	E	6,00	6,00		GPC-2.AMI, PC-14, PC-5, UC-2
12	Topological data analysis	E	6,00	6,00		GPC-1.AMI, GPC-2.AMI, PC-14, PC-8, UC-1
13	Industrial Programming in Haskell 2	E	3,00	3,00		GPC-4.AMI, PC-13, PC-2, UC-2
14	Lattice-Based Cryptography	E	3,00	3,00		GPC-4.AMI, PC-12, PC-14, PC-8, UC-1
	2nd year		18,00		18,00	
1	Algorithmic Game Theory	E	6,00	6,00	6,00	GPC-2.AMI, PC-12, PC-5, UC-3
2	Foundations of Tensor Computations	E	6,00	6,00	6,00	GPC-3.AMI, PC-1, PC-14, UC-2
3	One-Way Functions and Their Applications	E	6,00	6,00	6,00	GPC-4.AMI, PC-6, PC-7, PC-9, UC-2
4	Information Theory	E	6,00	6,00	6,00	GPC-1.AMI, PC-13, PC-14, UC-1
5	Introduction to Applied Cryptography	E	6,00	6,00	6,00	GPC-2.AMI, PC-14, PC-6, UC-2

6	Introduction to Functional Analysis	E	6,00		6,00	GPC-1.AMI, PC-5, PC-6, UC-1
7	Generative Artificial Intelligence	E	6,00		6,00	GPC-2.AMI, PC-2, PC-4, PC-8, PC-9, UC-3
	Magolego		15,00	6,00	9,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	6,00	9,00	GPC-4.AMI, PC-5, UC-1, UC-5, UC-6
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6

**Curriculum agreed:**

Academic Supervisor	Khuzieva A.E.	12.04.2024
Dean	ARZHANTSEV I.V.	12.04.2024
Head of Centre for Educational Model Design	LEPESHKIN I.A.	12.04.2024

\* Subject type:

Compulsory course	C
Elective course	E