



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 01.03.02 Applied Mathematics and Information Science
Educational Programme "Applied Mathematics and Information Science"

Implementing unit: St. Petersburg School of Mathematics, Physics and Computer Science, HSE, HSE - Saint Petersburg

Years of Study: 2022/2023 - 2025/2026

APPROVED
13.05.2022
Vice Rector
ROSHCHIN S.Y.
Signed with EDS

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		167,00	51,00	42,00	39,00	35,00	
	Core Professional Block (Major)		111,00	47,00	41,00	17,00	6,00	
1	Calculus 2	C	5,00		5,00			GPC-1, GPC-2, UC-1
2	Functional Programming	C	3,00		3,00			GPC-1, GPC-3, PC-2, UC-1, UC-2
3	Java programming language	C	4,00		4,00			GPC-2, GPC-4, PC-3, UC-1, UC-2
4	Probability Theory and Mathematical Statistics	C	13,00		8,00	5,00		GPC-1, GPC-3, UC-1
5	Formal Languages	C	3,00		3,00			GPC-1, GPC-2, PC-3, PC-5, UC-1, UC-2
6	Computer Architecture	C	5,00		5,00			GPC-4, UC-1
7	Operating Systems	C	6,00		6,00			GPC-4, UC-1
8	Software Development	C	6,00			6,00		GPC-1, GPC-2, PC-3, UC-1, UC-2
9	Machine Learning	C	3,00			3,00		UC-1
10	Parallel Programming	C	3,00			3,00		GPC-2, GPC-4, PC-1, PC-2, PC-3, UC-1
11	Algebra	C	4,00	4,00				GPC-1, GPC-3, UC-1
12	Linear Algebra and Geometry	C	7,00	7,00				GPC-1, GPC-3, UC-1
13	Introduction to Programming	C	6,00	6,00				GPC-2, GPC-3, GPC-4, UC-1, UC-2
14	C++ Programming Language	C	8,00	8,00				GPC-1, GPC-4, PC-1, PC-3, UC-1, UC-2
15	Web Searching and Ranging (offered in a foreign language)	C	6,00				6,00	GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-4, UC-1, UC-2
16	Discrete Mathematics	C	8,00	4,00	4,00			GPC-1, GPC-3, UC-1, UC-2
17	Algorithms and Data Structures	C	11,00	8,00	3,00			GPC-2, GPC-3, UC-1, UC-2
18	Calculus 1	C	10,00	10,00				GPC-1, GPC-3, UC-1
	Elective Professional Block (Major)		56,00	4,00	1,00	22,00	29,00	
	Research seminar		5,00			1,00	4,00	

1	Research Seminar	C	5,00			1,00	4,00	GPC-1, GPC-4, PC-1, PC-4, PC-5, UC-1, UC-2, UC-4, UC-6
	Elective Courses		10,00			10,00		
1	Alternative Languages for the JVM	E	5,00			5,00		GPC-3, GPC-4, PC-2, PC-3, UC-1, UC-2
2	Graphical Interfaces	E	5,00			5,00		GPC-2, PC-1, PC-6, UC-1
3	Compilers	E	5,00			5,00		GPC-3, PC-2, UC-1
4	Molecular Biology (offered in a foreign language)	E	5,00			5,00		GPC-1, GPC-2, GPC-4, PC-1, UC-1
5	Numerical Methods	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1
6	Databases	E	5,00			5,00		GPC-1, GPC-4, PC-4, UC-1
	Elective Courses		10,00			10,00		
1	Algorithms in Bioinformatics	E	5,00			5,00		GPC-1, GPC-2, GPC-5, PC-1, PC-2, UC-1
2	Deep Learning	E	5,00			5,00		GPC-1, GPC-3, PC-1, PC-2, UC-1, UC-2
3	Optimization Methods	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1, UC-2
4	Mobile Development	E	5,00			5,00		GPC-2, GPC-4, PC-1, PC-3, PC-5, UC-1
5	Programming Languages Semantics	E	5,00			5,00		GPC-2, PC-4, PC-5, UC-1
6	Computer Systems Technology	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1
7	Types and Programming Languages	E	5,00			5,00		GPC-1, GPC-4, PC-1, PC-3, UC-1
	Elective Courses		15,00				15,00	
1	Computer Graphics	E	5,00				5,00	GPC-1, GPC-3, PC-1, PC-2, UC-1
2	Large-Scale Machine Learning	E	5,00				5,00	GPC-1, GPC-4, PC-4, UC-1
3	Programming with Dependent Types	E	5,00				5,00	GPC-1, GPC-4, PC-3, PC-4, UC-1
4	Distributed Systems	E	5,00				5,00	GPC-1, GPC-3, PC-1, PC-2, UC-1
5	Meta Computing	E	4,00				4,00	GPC-1, GPC-4, PC-4, UC-1
6	Computational Geometry	E	4,00				4,00	GPC-2, PC-2, UC-1
	Elective Courses		9,00				9,00	
1	Computer Vision	E	5,00				5,00	GPC-1, GPC-2, GPC-4, GPC-5, PC-3, UC-1
2	Logical and Relational Programming	E	5,00				5,00	GPC-2, PC-5, UC-1
3	Image Analysis	E	3,00				3,00	GPC-3, PC-2, UC-1
4	Natural Language Processing	E	3,00				3,00	GPC-3, PC-2, PC-3, UC-1
5	Cryptographic Protocols	E	3,00				3,00	GPC-1, GPC-3, PC-2, PC-4, PC-6, UC-1
6	Program Analysis	E	3,00				3,00	GPC-4, PC-1, PC-4, UC-1
	Project Seminar		7,00	4,00	1,00	1,00	1,00	
1	Project Seminar	C	7,00	4,00	1,00	1,00	1,00	GPC-1, GPC-2, PC-2, PC-3, PC-4, UC-1, UC-3, UC-4, UC-6
	Internship		31,00	4,00	3,00	7,00	17,00	
	Professional Internship		4,00			4,00		
1	Work Experience Internship	C	4,00			4,00		GPC-2, GPC-3, PC-1, PC-3, PC-6, UC-1, UC-2, UC-3, UC-4, UC-6
	Project Internship		15,00	4,00	3,00	3,00	5,00	
1	Project	C	15,00	4,00	3,00	3,00	5,00	GPC-2, GPC-3, PC-2, PC-3, PC-4, UC-1, UC-3, UC-6

	Research Internship		12,00				12,00	
1	Preparation of Graduation Thesis	C	9,00				9,00	PC-1, PC-4, PC-5, UC-1, UC-2, UC-4, UC-6
2	Graduation Internship	C	3,00				3,00	GPC-2, GPC-3, GPC-4, PC-1, PC-3, PC-6, UC-1, UC-2, UC-3, UC-4, UC-6
	General Courses		14,00	5,00	5,00		4,00	
	Core General Courses		2,00	1,00	1,00			
1	Safe Living Basics	C	1,00	1,00				UC-11, UC-8
2	Physical Training	C	1,00		1,00			UC-7
	Optional General Courses		12,00	4,00	4,00		4,00	
1	Legal Literacy	C	4,00				4,00	UC-1, UC-10, UC-2, UC-4, UC-5
2	Economics	C	4,00	4,00				UC-1, UC-9
3	Elective General Course	E	4,00		4,00			UC-1
	Minor		20,00		10,00	10,00		
1	Minor	E	20,00		10,00	10,00		UC-1, UC-6
	English		1,00				1,00	
	Examinations		1,00				1,00	
1	Independent English Exam (offered in a foreign language)	C						UC-4
2	Project Proposal	C	1,00				1,00	UC-1, UC-2, UC-4
3	English Language Integrative Exam	C						UC-4
	Optional Courses							
1	Academic English Writing (offered in a foreign language)	O	2,00				2,00	UC-4
2	English (offered in a foreign language)	O	14,00	8,00	6,00			UC-4
	Data Culture		4,00				4,00	
1	Independent Programming Test. Advanced Level	C						PC-3
2	External Examinations on Digital Skills. Entry-level	C						GPC-4
3	External Examinations on Digital Skills. Intermediate Level	C						GPC-4
4	Data Science, AI and Generative Models Independent Test. Advanced Level	C	1,00				1,00	GPC-3, PC-2
5	External Examinations on Digital Skills. Final Level	C						GPC-4
6	Introduction to Machine Learning	C	3,00				3,00	UC-1
7	Independent Digital Literacy Test	C						GPC-4, PC-5
	Final State Certification (FSC)		3,00				3,00	
	Thesis Work		3,00				3,00	
1	Presenting of Graduation Thesis	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, UC-1, UC-2, UC-4

Curriculum agreed:

Academic Supervisor

OMELCHENKO A.V.

06.05.2022

Dean		06.05.2022
Deputy Director	KUZMIN P.V.	06.05.2022
Head of Centre for Educational Model Design	LEPESHKIN I.A.	12.05.2022

* Subject type:

Compulsory course	C
Elective course	E
Optional course	O