



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: 2024/2025 - 2027/2028

APPROVED
27.05.2024
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	50,00	42,00	40,00	35,00	
	Core Professional Block (Major)		111,00	47,00	41,00	17,00	6,00	
1	Algebra	C	4,00	4,00				GPC-1, GPC-3, UC-1
2	Discrete Mathematics	C	8,00	4,00	4,00			GPC-1, GPC-3, UC-1, UC-2
3	Linear Algebra and Geometry	C	7,00	7,00				GPC-1, GPC-3, UC-1
4	Calculus 1	C	10,00	10,00				GPC-1, GPC-3, UC-1
5	Introduction to Programming	C	6,00	6,00				GPC-2, GPC-3, GPC-4, UC-1, UC-2
6	C++ Programming Language	C	8,00	8,00				GPC-1, GPC-4, PC-1, PC-3, UC-1, UC-2
7	Formal Languages	C	3,00		3,00			GPC-1, GPC-2, PC-3, PC-5, UC-1, UC-2
8	Java programming language	C	4,00		4,00			GPC-2, GPC-4, PC-3, UC-1, UC-2
9	Functional Programming	C	3,00		3,00			GPC-1, GPC-3, PC-2, UC-1, UC-2
10	Software Development	C	6,00			6,00		GPC-1, GPC-2, PC-3, UC-1, UC-2
11	Parallel Programming	C	3,00			3,00		GPC-2, GPC-4, PC-1, PC-2, PC-3, UC-1
12	Web Searching and Ranging	C	6,00				6,00	GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-4, UC-1, UC-2
13	Calculus 2	C	5,00		5,00			GPC-1, GPC-2, UC-1
14	Theory of Probability and Mathematical Statistics	C	13,00		8,00	5,00		GPC-1, GPC-3, UC-1
15	Computer Architecture	C	5,00		5,00			GPC-4, UC-1
16	Operating Systems	C	6,00		6,00			GPC-4, UC-1
17	Introduction to Machine Learning	C	3,00			3,00		UC-1
18	Algorithms and Data Structures	C	11,00	8,00	3,00			GPC-2, GPC-3, UC-1, UC-2
	Elective Professional Block (Major)		56,00	3,00	1,00	23,00	29,00	
	Проектный семинар		6,00	3,00	1,00	1,00	1,00	

1	Project Seminar	C	6,00	3,00	1,00	1,00	1,00	GPC-1, GPC-2, PC-2, PC-3, PC-4, UC-1, UC-3, UC-4, UC-6
	Research seminar		6,00			2,00	4,00	
1	Research Seminar	C	6,00			2,00	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	Data Bases	E	5,00			5,00		GPC-1, GPC-4, PC-4, UC-1
3	Graphical Interfaces	E	5,00			5,00		GPC-2, PC-1, PC-6, UC-1
4	Compilers	E	5,00			5,00		GPC-3, PC-2, UC-1
5	Molecular Biology	E	5,00			5,00		GPC-1, GPC-2, GPC-4, PC-1, UC-1
6	Numerical Methods	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1
	Дисциплины по выбору		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	Meta Computing	E	5,00				5,00	GPC-1, GPC-4, PC-4, UC-1
2	Computational Geometry	E	5,00				5,00	GPC-2, PC-2, UC-1
3	Large-Scale Machine Learning	E	5,00				5,00	GPC-1, GPC-4, PC-4, UC-1
4	Programming with Dependent Types	E	5,00				5,00	GPC-1, GPC-4, PC-3, PC-4, UC-1
5	Computer Graphics	E	5,00				5,00	GPC-1, GPC-3, PC-1, PC-2, UC-1
6	Distributed Systems	E	5,00				5,00	GPC-1, GPC-3, PC-1, PC-2, UC-1
	Elective Courses		9,00				9,00	
1	Image Analysis	E	3,00				3,00	GPC-3, PC-2, UC-1
2	Program Analysis	E	3,00				3,00	GPC-4, PC-1, PC-4, UC-1
3	Computer Vision	E	3,00				3,00	GPC-1, GPC-2, GPC-4, GPC-5, PC-3, UC-1
4	Cryptographic Protocols	E	3,00				3,00	GPC-1, GPC-3, PC-2, PC-4, PC-6, UC-1
5	Logical and Relationa Programming	E	3,00				3,00	GPC-2, PC-5, UC-1
6	Natural Language Processing	E	3,00				3,00	GPC-3, PC-2, PC-3, UC-1
	Internship		31,00	3,00	4,00	6,00	18,00	
	Professional Internship		3,00			3,00		
1	Work Experience Internship	C	3,00			3,00		GPC-2, GPC-3, PC-1, PC-3, PC-6, UC-1, UC-2, UC-3, UC-4, UC-6
	Project Internship		16,00	3,00	4,00	3,00	6,00	
1	Project	C	16,00	3,00	4,00	3,00	6,00	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	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	7,00	4,00		3,00	
	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	6,00	3,00		3,00	
1	Economics	C	3,00		3,00			UC-9
2	Legal Literacy	C	3,00				3,00	UC-10
3	Russian History	C	4,00	4,00				UC-5
4	Foundations of Russian Statehood	C	2,00	2,00				UC-5
	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 (offered in a foreign language)	C	1,00				1,00	UC-1, UC-2, UC-4
3	English Language Integrative Exam (offered in a foreign language)	C						UC-4
	Optional Courses							
1	English (offered in a foreign language)	O	14,00	8,00	6,00			UC-4
2	Academic English Writing (offered in a foreign language)	O	2,00				2,00	UC-4
	Data Culture		4,00			4,00		
1	External Examinations on Digital Skills. Entry-level	C						GPC-4, PC-5
2	External Examinations on Digital Skills. Intermediate Level	C						PC-3
3	External Examinations on Digital Skills. Final Level	C						GPC-3, PC-2
4	Independent Programming Test. Advanced Level	C						PC-3
5	Independent Digital Literacy Test	C						GPC-4, PC-5
6	Data Science, AI and Generative Models Independent Test. Advanced Level	C	1,00			1,00		GPC-3, PC-2
7	Machine Learning	C	3,00			3,00		GPC-3, GPC-4, UC-1, UC-2
	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
	State Examinations							

Curriculum agreed:

Academic Supervisor	OMELCHENKO A.V.	13.05.2024
Dean		13.05.2024
Deputy Director	KUZMIN P.V.	13.05.2024
Head of Centre for Educational Model Design	LEPESHKIN I.A.	22.05.2024

* Subject type:
Compulsory course C
Elective course E
Optional course O