



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: 2021/2022 - 2024/2025

APPROVED
22.04.2021
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		165,00	50,00	43,00	38,00	34,00	
	Core Professional Block (Major)		108,00	46,00	42,00	15,00	5,00	
	Subject Areas		108,00	46,00	42,00	15,00	5,00	
	Discrete Mathematics		10,00	3,00	7,00			
1	Discrete Mathematics	C	7,00	3,00	4,00			GPC-1, GPC-3, UC-1, UC-2
2	Formal Languages	C	3,00		3,00			GPC-1, GPC-2, PC-3, PC-5, UC-1, UC-2
	Linear Algebra and Geometry		11,00	11,00				
1	Linear Algebra and Geometry	C	7,00	7,00				GPC-1, GPC-3, UC-1
2	Algebra	C	4,00	4,00				GPC-1, GPC-3, UC-1
	Mathematical Analysis		10,00	10,00				
1	Calculus 1	C	10,00	10,00				GPC-1, GPC-3, UC-1
	Probability Theory and Mathematical Statistics		15,00		10,00	5,00		
1	Probability Theory and Mathematical Statistics	C	15,00		10,00	5,00		GPC-1, GPC-3, UC-1
	Programming		37,00	14,00	8,00	10,00	5,00	
1	Software Development	C	6,00			6,00		GPC-1, GPC-2, PC-3, UC-1, UC-2
2	Parallel Programming	C	4,00			4,00		GPC-2, GPC-4, PC-1, PC-2, PC-3, UC-1
3	Web Searching and Ranging (offered in a foreign language)	C	5,00				5,00	GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-4, UC-1, UC-2
4	Introduction to Programming	C	6,00	6,00				GPC-2, GPC-3, GPC-4, UC-1, UC-2
5	C++ programming language	C	8,00	8,00				GPC-1, GPC-4, PC-1, PC-3, UC-1, UC-2
6	Java programming language	C	5,00		5,00			GPC-2, GPC-4, PC-3, UC-1, UC-2
7	Functional Programming	C	3,00		3,00			GPC-1, GPC-3, PC-2, UC-1, UC-2
	Algorithms and Data Structures		11,00	8,00	3,00			
1	Algorithms and Data Structures	C	11,00	8,00	3,00			GPC-2, GPC-3, UC-1, UC-2

	Optimization Methods		5,00		5,00			
1	Calculus 2	C	5,00		5,00			GPC-1, GPC-2, UC-1
	Computer Architecture and Operating Systems		9,00		9,00			
1	Computer Architecture and Operating Systems	C	9,00		9,00			GPC-4, UC-1
	Elective Professional Block (Major)		57,00	4,00	1,00	23,00	29,00	
	Elective Courses		20,00			20,00		
1	Algorithms in Bioinformatics	E	5,00			5,00		GPC-1, GPC-2, PC-1, PC-2, UC-1
2	Alternative Languages for the JVM	E	5,00			5,00		GPC-3, GPC-4, PC-2, PC-3, UC-1, UC-2
3	Databases	E	5,00			5,00		GPC-1, GPC-4, PC-4, UC-1
4	Deep Learning	E	5,00			5,00		GPC-1, GPC-3, PC-1, PC-2, UC-1, UC-2
5	Graphical Interfaces	E	5,00			5,00		GPC-2, PC-1, PC-6, UC-1
6	Compilers	E	5,00			5,00		GPC-3, PC-2, UC-1
7	Optimization Methods	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1, UC-2
8	Mobile Development	E	5,00			5,00		GPC-2, GPC-4, PC-1, PC-3, PC-5, UC-1
9	Molecular Biology (offered in a foreign language)	E	5,00			5,00		GPC-1, PC-1, UC-1
10	Programming Languages Semantics	E	5,00			5,00		GPC-2, PC-4, PC-5, UC-1
11	Information Theory	E	5,00			5,00		GPC-3, PC-5, UC-1
12	Computer Systems Technology	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1
13	Types and Programming Languages	E	5,00			5,00		GPC-1, GPC-4, PC-1, PC-3, UC-1
14	Numerical Methods	E	5,00			5,00		GPC-1, GPC-3, PC-2, PC-6, UC-1
	Elective Courses		15,00				15,00	
1	Computational Geometry	E	5,00				5,00	GPC-2, PC-2, UC-1
2	Computer Graphics	E	5,00				5,00	GPC-1, GPC-3, PC-1, PC-2, UC-1
3	Meta Computing	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	Large-Scale Machine Learning	E	5,00				5,00	GPC-1, GPC-4, PC-4, 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	Cryptographic Protocols	E	3,00				3,00	GPC-1, GPC-3, PC-2, PC-4, PC-6, UC-1
4	Natural Language Processing	E	3,00				3,00	GPC-3, PC-2, PC-3, UC-1
5	Computer Vision	E	3,00				3,00	GPC-1, GPC-2, GPC-4, PC-3, UC-1
6	Logical and Relational Programming	E	3,00				3,00	GPC-2, PC-5, UC-1
	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
	Проектный семинар		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	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	4,00	3,00	3,00	6,00	
1	Project	C	16,00	4,00	3,00	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	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
2	Preparation of Graduation Thesis	C	9,00				9,00	PC-1, PC-4, PC-5, UC-1, UC-2, UC-4, UC-6
	General Courses		14,00	6,00	4,00		4,00	
	Core General Courses		2,00	2,00				
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-10
2	Economics	C	4,00	4,00				UC-1, UC-9
3	Psychology	C	4,00		4,00			UC-1, 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	C						UC-4
	Optional Courses							
1	Academic English Writing (offered in a foreign language)	O	2,00				2,00	UC-4
2	English	O	14,00	8,00	6,00			UC-4
	Data Culture		6,00			6,00		
1	Machine Learning	C	5,00			5,00		GPC-3, GPC-4, PC-1, UC-1, UC-2
2	Independent Data Science Test. Advanced Level	C	1,00			1,00		GPC-3, PC-2
3	Independent Digital Literacy Test	C						GPC-4, PC-5
4	Independent Programming Test. Advanced Level	C						PC-3
	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	Храбров А.И.	05.04.2021
Dean		05.04.2021
Deputy Director	KUZMIN P.V.	07.04.2021
Head of Centre for Educational Model Design	LEPESHKIN I.A.	21.04.2021

* Subject type:

Compulsory course	C
Elective course	E
Optional course	O