



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 03.03.02 Physics
Educational Programme "Physics"

Specializations: "Quantum Field Theory", "Solid State Physics"

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

Years of Study: 2022/2023 - 2025/2026

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED
18.05.2022
Vice Rector
ROSHCHIN S.Y.
Signed with EDS

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	48,00	49,00	43,00	27,00	
	Core Professional Block (Major)		117,00	40,00	44,00	22,00	11,00	
1	Differential Equations	C	3,00		3,00			GPC-2, PC-5
2	Mathematical Physics	C	5,00		5,00			GPC-2, PC-5
3	Theory of Complex Functions	C	4,00		4,00			GPC-2, PC-5
4	Optics	C	9,00		9,00			GPC-2, PC-1, UC-1
5	Thermodynamics and Molecular Physics	C	9,00		9,00			GPC-2, PC-1, UC-1
6	Analytical Mechanics	C	4,00		4,00			GPC-2, PC-3
7	Field Theory	C	4,00		4,00			GPC-2, PC-3
8	Mechanics	C	10,00	10,00				GPC-2, PC-1, UC-1
9	Electricity and Magnetism	C	10,00	10,00				GPC-2, PC-1, UC-1
10	Electrodynamics of Continuous Media	C	3,00			3,00		GPC-2, PC-5
11	Mathematical Methods in Physics	C	6,00	6,00				GPC-2, PC-3
12	Quantum Mechanics	C	5,00			5,00		GPC-2, PC-4
13	Condensed Condition Physics	C	7,00			4,00	3,00	GPC-2, PC-4
14	Statistical Physics	C	4,00				4,00	GPC-2, PC-4
15	Probability Theory	C	3,00			3,00		GPC-2, PC-5
16	Calculus	C	11,00	8,00	3,00			GPC-2, PC-5
17	Linear Algebra	C	9,00	6,00	3,00			GPC-2, PC-5
18	Mathematical Statistics	C	3,00			3,00		GPC-2, GPC-3
19	Approximate Methods of analytical calculations	C	4,00			4,00		GPC-2, PC-5
20	Numerical Methods	C	4,00				4,00	GPC-2, PC-5
	Elective Professional Block (Major)		50,00	8,00	5,00	21,00	16,00	
	-		31,00			15,00	16,00	

	Дисциплины специализации "Квантовая теория поля"		31,00			17,00	14,00	
1	Differential Geometry and Topology	E	6,00			6,00		PC-3, PC-4
2	General Relativity	E	3,00				3,00	PC-3, PC-4
3	Group theory	E	6,00			6,00		PC-3, PC-4
4	Quantum field theory 1	E	5,00			5,00		PC-3, PC-4
5	Quantum field theory 2	E	4,00				4,00	PC-3, PC-5
6	Functional methods	E	4,00				4,00	PC-4, PC-5
7	Computer methods in theoretical physics	E	3,00				3,00	PC-3, PC-4
	Дисциплины специализации "Физика твёрдого тела"		31,00			17,00	14,00	
1	Group theory	E	6,00			6,00		PC-3, PC-4
2	Electronics and Circuit Engineering	E	5,00			3,00	2,00	PC-4, PC-5
3	Quantum field theory 1	E	5,00			5,00		PC-3, PC-4
4	Semiconductor optics	E	3,00				3,00	PC-3, PC-4
5	Optics of solids	E	3,00				3,00	PC-4, PC-5
6	Semiconductor physics	E	3,00				3,00	PC-4, PC-5
7	Introduction to Nanotechnology	E	3,00			3,00		PC-4, PC-5
8	Laboratory of Nanoelectronics	E	3,00				3,00	PC-5, UC-3
	Научно-исследовательский семинар (НИС)		13,00	8,00	5,00			
1	Students' research seminar	C	13,00	8,00	5,00			PC-5, UC-3, UC-4
	Проектный семинар		6,00			6,00		
1	Project seminar on quantum field theory	E	6,00			4,00	2,00	PC-5, UC-3, UC-4
2	Project seminar on solid state physics	E	6,00			4,00	2,00	PC-5, UC-3, UC-4
	Internship		30,00			5,00	25,00	
	Professional Internship		5,00			5,00		
1	Educational Internship	C	5,00			5,00		GPC-2, PC-5, UC-3
	Project Internship		10,00				10,00	
1	Projects	C	10,00				10,00	PC-5, UC-3, UC-4
	Research Internship		15,00				15,00	
1	Preparation of Graduation Thesis	C	15,00				15,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, PC-4, PC-5, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6, UC-7, UC-8
	General Courses		14,00	9,00	1,00		4,00	
	Core General Courses		2,00	1,00	1,00			
1	Safe Living Basics	C	1,00	1,00				UC-11
2	Physical Training	C	1,00		1,00			UC-7
	Optional General Courses		12,00	8,00			4,00	
1	Elective General Course	E	4,00				4,00	UC-1
2	Economics	C	4,00	4,00				UC-2, UC-9
3	Legal Literacy	C	4,00	4,00				UC-1, UC-10, UC-2, UC-4, UC-5
	Minor		20,00		10,00	10,00		
1	Minor	E	20,00		10,00	10,00		UC-1

	English		1,00				1,00	
	Examinations		1,00				1,00	
1	Independent English Exam	C						UC-4
2	Project Proposal	C	1,00				1,00	UC-4
3	English Language Integrative Exam	C						UC-4
	Optional Courses							
1	Academic English Writing	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		5,00	3,00		2,00		
1	External Examinations on Digital Skills. Entry-level	C						GPC-3
2	External Examinations on Digital Skills. Intermediate Level	C						GPC-3
3	External Examinations on Digital Skills. Final Level	C						GPC-3
4	Independent Data Science Test. Intermediate	C	1,00			1,00		GPC-3
5	Independent Digital Literacy Test	C						GPC-3
6	Independent Programming Test. Intermediate	C						GPC-3
7	Introduction to Python for Data Science	C	4,00	3,00		1,00		GPC-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, PC-1, PC-2, PC-3, PC-4, PC-5, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6, UC-7, UC-8

Curriculum agreed:

Academic Supervisor	SHENDEROVICH I.E.	12.05.2022
Dean		12.05.2022
Deputy Director	KUZMIN P.V.	13.05.2022
Head of Centre for Educational Model Design	LEPESHKIN I.A.	17.05.2022

* Subject type:

Compulsory course	C
Elective course	E
Optional course	O