



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: 2023/2024 - 2026/2027

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED
23.05.2023
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		166,00	50,00	46,00	43,00	27,00	
	Core Professional Block (Major)		113,00	39,00	41,00	22,00	11,00	
1	Mechanics	C	9,00	9,00				GPC-2, PC-1, UC-1
2	Electricity and Magnetism	C	8,00	8,00				GPC-2, PC-1, UC-1
3	Electrodynamics of Continuous Media	C	3,00			3,00		GPC-2, PC-5
4	Mathematical Methods in Physics	C	6,00	6,00				GPC-2, PC-3
5	Quantum Mechanics	C	5,00			5,00		GPC-2, PC-4
6	Condensed Condition Physics	C	7,00			4,00	3,00	GPC-2, PC-4
7	Statistical Physics	C	4,00				4,00	GPC-2, PC-4
8	Probability Theory	C	3,00			3,00		GPC-2, PC-5
9	Linear Algebra	C	9,00	6,00	3,00			GPC-2, PC-5
10	Mathematical Statistics	C	3,00			3,00		GPC-2, GPC-3
11	Approximate Methods of analytical calculations	C	4,00			4,00		GPC-2, PC-5
12	Numerical Methods	C	4,00				4,00	GPC-2, PC-5
13	Differential Equations	C	3,00		3,00			GPC-2, PC-5
14	Mathematical Physics	C	4,00		4,00			GPC-2, PC-5
15	Theory of Complex Functions	C	4,00		4,00			GPC-2, PC-5
16	Optics	C	8,00		8,00			GPC-2, PC-1, UC-1
17	Analytical Mechanics	C	4,00		4,00			GPC-2, PC-3
18	Field Theory	C	4,00		4,00			GPC-2, PC-3
19	Thermodynamics and Molecular Physics	C	8,00		8,00			GPC-2, PC-1, UC-1
20	Calculus 1	C	10,00	10,00				GPC-1, UC-1
21	Calculus 2	C	3,00		3,00			GPC-1, UC-1
	Elective Professional Block (Major)		53,00	11,00	5,00	21,00	16,00	

	Choice of Specialization		31,00			15,00	16,00	
	Дисциплины специализации "Квантовая теория поля"		31,00			17,00	14,00	
1	Differential Geometry and Topology	C	6,00			6,00		PC-3, PC-4
2	General Relativity	C	3,00				3,00	PC-3, PC-4
3	Group theory	C	6,00			6,00		PC-3, PC-4
4	Quantum field theory 1	C	5,00			5,00		PC-3, PC-4
5	Quantum field theory 2	C	4,00				4,00	PC-3, PC-5
6	Functional methods	C	4,00				4,00	PC-4, PC-5
7	Computer methods in theoretical physics	C	3,00				3,00	PC-3, PC-4
	Дисциплины специализации "Физика твёрдого тела"		31,00			17,00	14,00	
1	Group theory	C	6,00			6,00		PC-3, PC-4
2	Electronics and Circuit Engineering	C	5,00			3,00	2,00	PC-4, PC-5
3	Quantum field theory 1	C	5,00			5,00		PC-3, PC-4
4	Semiconductor optics	C	3,00				3,00	PC-3, PC-4
5	Optics of solids	C	3,00				3,00	PC-4, PC-5
6	Semiconductor physics	C	3,00				3,00	PC-4, PC-5
7	Introduction to Nanotechnology	C	3,00			3,00		PC-4, PC-5
8	Laboratory of Nanoelectronics	C	3,00				3,00	PC-5, UC-3
	Research seminar		16,00	11,00	5,00			
1	Research Seminar	C	16,00	11,00	5,00			PC-5, UC-3, UC-4
	Project Seminar		6,00			6,00		
1	Project seminar on quantum field theory	C	6,00			4,00	2,00	PC-5, UC-3, UC-4
2	Project seminar on solid state physics	C	6,00			4,00	2,00	PC-5, UC-3, UC-4
	Internship		31,00			5,00	26,00	
	Professional Internship		5,00			5,00		
1	Educational Internship	C	5,00			5,00		GPC-2, PC-5, UC-3
	Project Internship		11,00				11,00	
1	Projects	C	11,00				11,00	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	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	Russian History	C	4,00	4,00				UC-5
2	Legal Literacy	C	3,00		3,00			UC-1, UC-10, UC-2, UC-4, UC-5
3	Economics	C	3,00				3,00	UC-2, UC-9
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
	English		1,00				1,00	
	Examinations		1,00				1,00	
1	Independent English Exam							UC-4
2	Project Proposal (offered in a foreign language)	C	1,00				1,00	UC-4
3	English Language Integrative Exam	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		5,00	3,00		2,00		
1	Independent Data Science Test. Intermediate	C	1,00			1,00		GPC-3
2	Introduction to Python for Data Science	C	4,00	3,00		1,00		GPC-3
3	Independent Digital Literacy Test	C						GPC-3
4	Independent Programming Test. Intermediate	C						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
	State Examinations							

Curriculum agreed:

Academic Supervisor	SHENDEROVICH I.E.	19.05.2023
Dean		19.05.2023
Deputy Director	KUZMIN P.V.	19.05.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	22.05.2023

* Subject type:

Compulsory course	C
Elective course	E
Optional course	O