



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: 2021/2022 - 2024/2025

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED
22.04.2021
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		165,00	47,00	50,00	43,00	25,00	
	Core Professional Block (Major)		115,00	40,00	44,00	22,00	9,00	
	Subject Areas		115,00	40,00	44,00	22,00	9,00	
	General Physics		38,00	20,00	18,00			
1	Thermodynamics and Molecular Physics	C	9,00		9,00			GPC-3, PC-1, UC-1
2	Optics	C	9,00		9,00			GPC-3, PC-1, UC-1
3	Mechanics	C	10,00	10,00				GPC-3, PC-1, UC-1
4	Electricity and Magnetism	C	10,00	10,00				GPC-3, PC-1, UC-1
	Theoretical Physics		38,00	6,00	10,00	15,00	7,00	
1	Quantum Mechanics	C	8,00			8,00		GPC-3, PC-4
2	Condensed Condition Physics	C	6,00			3,00	3,00	GPC-3, PC-4
3	Electrodynamics of Continuous Media	C	4,00			4,00		GPC-3, PC-5
4	Analytical Mechanics	C	4,00		4,00			GPC-3, PC-3
5	Field Theory	C	4,00		4,00			GPC-3, PC-3
6	Mathematical Methods in Physics	C	6,00	6,00				GPC-3, PC-3
7	Mechanics of liquids and gases	C	2,00		2,00			GPC-3, PC-4
8	Statistical Physics	C	4,00				4,00	GPC-3, PC-4
	Mathematics		34,00	14,00	16,00	4,00		
1	Probability Theory	C	4,00			4,00		GPC-2, PC-5
2	Differential Equations	C	3,00		3,00			GPC-2, PC-5
3	Theory of Complex Functions	C	3,00		3,00			GPC-2, PC-5
4	Mathematical Physics	C	4,00		4,00			GPC-2, PC-5
5	Calculus	C	11,00	8,00	3,00			GPC-1, GPC-2, PC-5
6	Linear Algebra	C	9,00	6,00	3,00			GPC-1, GPC-2, PC-5

	Computational Physics		5,00			3,00	2,00	
1	Approximate Methods of analytical calculations	C	3,00			3,00		GPC-2, PC-5
2	Numerical Methods	C	2,00				2,00	GPC-2, PC-5
	Elective Professional Block (Major)		50,00	7,00	6,00	21,00	16,00	
	-		31,00			17,00	14,00	
	Дисциплины специализации "Квантовая теория поля"		31,00			17,00	14,00	
1	Differential Geometry and Topology	E	5,00			5,00		PC-3, PC-4
2	Quantum field theory 1 (offered in a foreign language)	E	5,00			5,00		PC-3, PC-4
3	Group theory	E	7,00			7,00		PC-3, PC-4
4	General Relativity	E	3,00				3,00	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	Introduction to Nanotechnology	E	5,00			5,00		PC-4, PC-5
2	Quantum field theory 1 (offered in a foreign language)	E	5,00			5,00		PC-3, PC-4
3	Group theory	E	7,00			7,00		PC-3, PC-4
4	Semiconductor Devices	C	5,00				5,00	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	Laboratory of Nanoelectronics	E	3,00				3,00	PC-5, UC-3
	Научно-исследовательский семинар (НИС)		13,00	7,00	6,00			
1	Students' research seminar	C	13,00	7,00	6,00			GPC-7, GPC-9, PC-5
	Проектный семинар		6,00			4,00	2,00	
1	Project seminar on quantum field theory	E	6,00			4,00	2,00	GPC-7, PC-5, UC-3
2	Project seminar on solid state physics	E	6,00			4,00	2,00	GPC-7, PC-5, UC-3
	Internship		30,00			3,00	27,00	
	Professional Internship		5,00			3,00	2,00	
1	Graduation Internship	C	2,00				2,00	GPC-1, GPC-3, GPC-5, PC-3, UC-1
2	Educational Internship	C	3,00			3,00		GPC-3, PC-5, UC-3
	Project Internship		10,00				10,00	
1	Projects	C	10,00				10,00	GPC-7, PC-5, UC-3
	Research Internship		15,00				15,00	
1	Preparation of Graduation Thesis	C	15,00				15,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, GPC-9, 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	10,00			4,00	
	Core General Courses		2,00	2,00				
1	Safe Living Basics	C	1,00	1,00				GPC-4, UC-11, UC-8

2	Physical Training	C	1,00	1,00				UC-7
	Optional General Courses		12,00	8,00			4,00	
1	Philosophy of Science	C	4,00				4,00	UC-5
2	Legal Literacy	C	4,00	4,00				UC-1, UC-10, UC-2, UC-4, UC-5
3	Economics	C	4,00	4,00				UC-2, UC-9
	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 (offered in a foreign language)	C						UC-4
2	Project Proposal (offered in a foreign language)	C	1,00				1,00	GPC-7, 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		7,00	3,00		4,00		
1	Independent Data Science Test. Intermediate	C	1,00			1,00		GPC-5, GPC-6
2	Introduction to Python for Data Science	C	6,00	3,00		3,00		GPC-5, GPC-6
3	Independent Digital Literacy Test	C						GPC-5, GPC-6
4	Independent Programming Test. Intermediate	C						GPC-5, GPC-6
	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, GPC-5, GPC-6, GPC-7, GPC-8, GPC-9, 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.	05.04.2021
Dean		05.04.2021
Deputy Director	KUZMIN P.V.	13.04.2021
Head of Centre for Educational Model Design	LEPESHKIN I.A.	20.04.2021

* Subject type:

Compulsory course

C

Elective course

E

Optional course

O