



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: 2020/2021 - 2023/2024

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED
13.04.2021
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		169,00	47,00	50,00	45,00	27,00	
	Core Professional Block (Major)		119,00	40,00	44,00	24,00	11,00	
	Subject Areas		119,00	40,00	44,00	24,00	11,00	
	General Physics		36,00	18,00	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	9,00	9,00				GPC-3, PC-1, UC-1
4	Electricity and Magnetism	C	9,00	9,00				GPC-3, PC-1, UC-1
	Theoretical Physics		37,00	3,00	10,00	17,00	7,00	
1	Analytical Mechanics	C	4,00		4,00			GPC-3, PC-3
2	Field Theory	C	4,00		4,00			GPC-3, PC-3
3	Quantum Mechanics	C	8,00			8,00		GPC-3, PC-4
4	Condensed Condition Physics	C	6,00			3,00	3,00	GPC-3, PC-4
5	Statistical Physics	C	4,00				4,00	GPC-3, PC-4
6	Mechanics of liquids and gases	C	4,00		2,00	2,00		GPC-3, PC-4
7	Electrodynamics of Continuos Media	C	4,00			4,00		GPC-3, PC-5
8	Mathematical Methods in Physics	C	3,00	3,00				GPC-3, PC-3
	Mathematics		39,00	19,00	16,00	4,00		
1	Differential Equations	C	3,00		3,00			GPC-2, PC-5
2	Theory of Complex Functions	C	3,00		3,00			GPC-2, PC-5
3	Mathematical Physics	C	4,00		4,00			GPC-2, PC-5
4	Probability Theory	C	4,00			4,00		GPC-2, PC-5
5	Methods of Theoretical Physics	C	3,00	3,00				GPC-3, PC-3, UC-4
6	Calculus	C	11,00	8,00	3,00			GPC-1, GPC-2, PC-5

7	Linear Algebra	C	11,00	8,00	3,00			GPC-1, GPC-2, PC-5
	Computational Physics		7,00			3,00	4,00	
1	Numerical Methods	C	4,00				4,00	GPC-2, PC-5
2	Approximate Methods of analytical calculations	C	3,00			3,00		GPC-2, PC-5
	Elective Professional Block (Major)		50,00	7,00	6,00	21,00	16,00	
	Выбор специализации (1 из 2)		31,00			17,00	14,00	
	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	E	3,00				3,00	PC-3, PC-4
3	Quantum field theory 2	E	4,00				4,00	PC-3, PC-5
4	Functional methods	E	4,00				4,00	PC-4, PC-5
5	Computer methods in theoretical physics	E	3,00				3,00	PC-3, PC-4
6	Quantum field theory 1 (offered in a foreign language)	C	5,00			5,00		PC-3, PC-4
7	Group theory	C	6,00			6,00		PC-3, PC-4
	Дисциплины специализации "Физика твёрдого тела"		31,00			17,00	14,00	
1	Quantum optoelectronics	C	5,00				5,00	PC-3, PC-5
2	Semiconductor Devices Physics	C	4,00				4,00	PC-3, PC-4
3	Semiconductor Devices	C	5,00				5,00	PC-3, PC-4
4	Group theory	C	6,00			6,00		PC-3, PC-4
5	Electronics and Circuit Engineering	C	3,00			3,00		PC-4, PC-5
6	Quantum field theory 1 (offered in a foreign language)	C	5,00			5,00		PC-3, PC-4
7	Introduction to Nanotechnology	C	3,00			3,00		PC-4, PC-5
	Научно-исследовательский семинар (НИС)		13,00	7,00	6,00			
1	Students' research seminar	C	13,00	7,00	6,00			PC-5
	Проектный семинар		6,00			4,00	2,00	
1	Project seminar on quantum field theory	C	6,00			4,00	2,00	GPC-3, PC-5, UC-3
2	Project seminar on solid state physics	C	6,00			4,00	2,00	GPC-3, PC-5, UC-3
	Internship		30,00			5,00	25,00	
	Professional Internship		5,00			5,00		
1	Educational Internship	C	5,00			5,00		GPC-3, PC-5, UC-3
	Project Internship		1,00				1,00	
1	Projects	C	1,00				1,00	GPC-3, PC-5, UC-3
	Research Internship		24,00				24,00	
1	Graduation Internship	C	9,00				9,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, PC-4, PC-5, UC-1, UC-2, UC-3
2	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	10,00			4,00	
	Core General Courses		2,00	2,00				

1	Physical Training	C	1,00	1,00				UC-6, UC-7
2	Safe Living Basics	C	1,00	1,00				UC-11, UC-8
	Optional General Courses		12,00	8,00			4,00	
1	Philosophy of Science	C	4,00				4,00	UC-5
2	Economics	C	4,00	4,00				UC-2, UC-9
3	Law	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	Project Proposal (offered in a foreign language)	C	1,00				1,00	UC-1, UC-2, UC-4
2	English Language Integrative Exam	C						UC-4
3	Independent English Exam (offered in a foreign language)	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		3,00	3,00				
1	Python Programming Language	C	3,00	3,00				GPC-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, 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.	30.03.2021
Dean		30.03.2021
Deputy Director	KUZMIN P.V.	02.04.2021
Head of Centre for Educational Model Design	LEPESHKIN I.A.	12.04.2021

* Subject type:

Compulsory course	C
Elective course	E

Optional course

O