



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 03.03.02 Physics
Educational Programme "Physics"

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

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

Years of Study: 2024/2025 - 2027/2028

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED
20.05.2024
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	50,00	46,00	39,00	32,00	
	Core Professional Block (Major)		114,00	39,00	41,00	22,00	12,00	
1	Analytical Mechanics	C	4,00		4,00			GPC-2, PC-3
2	Differential Equations	C	3,00		3,00			GPC-2, PC-5
3	Mathematical Physics	C	4,00		4,00			GPC-2, PC-5
4	Calculus 2	C	3,00		3,00			GPC-1, UC-1
5	Optics	C	8,00		8,00			GPC-2, PC-1, UC-1
6	Electrodynamics	C	5,00		5,00			GPC-2, PC-5
7	Theory of Complex Functions	C	4,00		4,00			GPC-2, PC-5
8	Thermodynamics and Molecular Physics	C	7,00		7,00			GPC-2, PC-1, UC-1
9	Introduction to Machine Learning	C	3,00			3,00		GPC-3
10	Quantum Mechanics	C	4,00			4,00		GPC-2, PC-4
11	Mathematical Statistics	C	4,00			4,00		GPC-2, GPC-3
12	Approximate methods of analytical calculations	C	4,00			4,00		GPC-2, PC-5
13	Probability Theory	C	3,00			3,00		GPC-2, PC-5
14	Condensed Condition Physics	C	8,00			4,00	4,00	GPC-2, PC-4
15	Mathematical modeling in physics	C	4,00				4,00	GPC-2, PC-3
16	Numerical Methods	C	4,00				4,00	GPC-2, PC-5
17	Linear Algebra	C	9,00	6,00	3,00			GPC-2, PC-5
18	Calculus 1	C	10,00	10,00				GPC-1, UC-1
19	Mathematical Methods in Physics	C	6,00	6,00				GPC-2, PC-3
20	Mechanics	C	9,00	9,00				GPC-2, PC-1, UC-1
21	Electricity and Magnetism	C	8,00	8,00				GPC-2, PC-1, UC-1
	Elective Professional Block (Major)		53,00	11,00	5,00	17,00	20,00	

	Choice of Specialization		31,00			15,00	16,00	
	Дисциплины специализации "Квантовая теория поля"		31,00			15,00	16,00	
1	Differential Geometry and Topology	C	5,00			5,00		PC-3, PC-4
2	Statistical Physics	C	5,00			5,00		GPC-3, PC-4
3	Group theory	C	5,00			5,00		PC-3, PC-4
4	Quantum field theory 1 (offered in a foreign language)	C	5,00				5,00	PC-3, PC-4
5	General Relativity	C	5,00				5,00	PC-3, PC-4
6	Quantum field theory 2	C	6,00				6,00	PC-3, PC-5
	Дисциплины специализации "Физика твёрдого тела"		31,00			15,00	16,00	
1	Statistical Physics	C	5,00			5,00		GPC-3, PC-4
2	Group theory	C	5,00			5,00		PC-3, PC-4
3	Electronics and Circuit Engineering	C	5,00			5,00		PC-4, PC-5
4	Quantum optoelectronics	C	5,00				5,00	GPC-3, PC-4
5	Physics and technology of semiconductor devices	C	6,00				6,00	PC-4, PC-5
6	Semiconductor Devices Physics	C	5,00				5,00	PC-4, PC-5
	Disciplines of the specialization "Physical Mechanics"		31,00			15,00	16,00	
1	Physical mechanics	C	5,00			5,00		PC-3, PC-4
2	Rigid body dynamics	C	10,00			5,00	5,00	PC-3, PC-4
3	theory of elasticity	C	5,00			5,00		PC-3, PC-4
4	Advanced Topics in Mathematical Physics	C	6,00				6,00	GPC-2, PC-5
5	Electrodynamics of Continuos Media	C	5,00				5,00	GPC-2, PC-5
	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			2,00	4,00	
1	Project seminar on quantum field theory (offered in a foreign language)	C	6,00			2,00	4,00	PC-5, UC-3, UC-4
2	Project seminar on solid state physics (offered in a foreign language)	C	6,00			2,00	4,00	PC-5, UC-3, UC-4
3	Project Seminar "Physical Mechanics" (offered in a foreign language)	C	6,00			2,00	4,00	PC-5, UC-3, UC-4
	Internship		31,00			10,00	21,00	
	Professional Internship		10,00			10,00		
1	Educational Internship	C	10,00			10,00		GPC-2, PC-5, UC-3
	Project Internship		6,00				6,00	
1	Project	C	6,00				6,00	GPC-1, 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-8
	General Courses		14,00	7,00	4,00		3,00	
	Core General Courses		2,00	1,00	1,00			

1	Physical Training	C	1,00		1,00			UC-7
2	Safe Living Basics	C	1,00	1,00				UC-11, UC-8
	Optional General Courses		12,00	6,00	3,00		3,00	
1	Russian History	C	4,00	4,00				UC-5
2	Foundations of Russian Statehood	C	2,00	2,00				UC-5
3	Legal Literacy	C	3,00		3,00			UC-1, UC-10, UC-2, UC-4, UC-5
4	Economics	C	3,00				3,00	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	UC-4
3	English Language Integrative Exam (offered in a foreign language)	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		4,00	3,00		1,00		
1	Independent Digital Literacy Test	C						GPC-3
2	Independent Programming Test. Intermediate	C						GPC-3
3	Data Science, AI and Generative Models Independent Test. Intermediate	C	1,00			1,00		GPC-3
4	External Examinations on Digital Skills. Entry-level	C						GPC-3
5	External Examinations on Digital Skills. Intermediate Level	C						GPC-3
6	External Examinations on Digital Skills. Final Level	C						GPC-3
7	Introduction to Python for Data Science	C	3,00	3,00				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
	State Examinations							

Curriculum agreed:

Academic Supervisor

SHENDEROVICH I.E.

08.05.2024

Dean

08.05.2024

Deputy Director

KUZMIN P.V.

08.05.2024

Head of Centre for
Educational Model Design

LEPESHKIN I.A.

14.05.2024

* Subject type:

Compulsory course

C

Elective course

E

Optional course

O