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APPROVED

Vice Rector for Academic Affairs

A. A. Voronov

Ministry of Science and Higher Education of the Russian Federation
 The Federal State Autonomous Educational Institution of Higher Education
 "Moscow Institute of Physics and Technology (National Research University)"

ACADEMIC PLAN

Qualification Master

Year of enrollment 2023

Statutory duration of a study course 2 years

AGREED

Head of Landau Phystech-School of Physics & Research

A. V. Rogachev

Domain of study: 12.04.03 - Photonics and Optical Informatics
 Orientation (specialty): Photonics, Quantum Technologies & 2D
 Materials/Фотоника, квантовые технологии и двумерные материалы
 Landau Phystech-School of Physics & Research

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters			Hours									Coursework and test papers	hours in week								TOTAL HOURS	Credit points		
		Examinations	Graded test ("-" - simple)	State Examination	Laboratory classes	of them						Hours for preparation and examinations	Distribution by courses and semesters				Total	Basic	Elective							
						Total classroom sessions	Lectures	Laboratory classes	Practical lessons, seminars, exercises, etc.	Practice	Independent study		1 course		2 course											
		1	2	3	4	1	2	3	4	1	2	3	4		1 sem. 15 weeks	2 sem. 15 weeks	3 sem. 15 weeks	4 sem. 15 weeks	15	16	17	18				
		lect.	lab.	sem.	lect.	lab.	sem.	lect.	lab.	sem.	lect.	lab.	sem.		lect.	lab.	sem.									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22					
M.1	Courses (Modules)/Дисциплины (модули)																									
M.1.1	Foreign Languages/Иностранные языки								120			60		4					180	4	4					
							-1		90	60		60	30	2		4			90	2	2					
							2		90	60		60	30	2			4		90	2	2					
	Humanitarian and Social Cycle/Гуманитарный и социальный цикл								165	60	60			4					225	5	5					
M.1.2	Global Trends and Methods for Strategic Development in the Era of Uncertainty/Глобальные тренды и методы стратегического развития в эпоху неопределенности	1							60	30	30			2	2				90	2	2					
M.1.3	Digital Transformation: Social and Economic Challenges/Цифровая трансформация: социальные и экономические вызовы		2						105	30	30			2			2		135	3	3					
	Specialty (by choice)																									
	Specialty 1 Applied Quantum Technologies/Прикладные квантовые технологии (Chair of the Russian Quantum Centre)								4 575	225	180	30	15	4 020	330	150			4 725	105	90	15				
	including practical training								4 020					4 020	30				4 050	90	90					
	Specialty 2 Advanced 2D Materials/Перспективные двумерные материалы (Chair of Physics and Technology of nanostructures)								4 425	390	300	30	60	3 705	330	300			4 725	105	83	22				
	including practical training								3 705					3 705	30				3 735	83	83					
M.3	State Final Certification/Государственная итоговая аттестация																									
M.3.1	Performance of and Defence of Graduation Thesis/Выполнение и защита выпускной квалификационной работы						4												270	6	6					

Acting Head of Academic Management Office

T. F. Artemenko

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Landau Phystech-School of Physics & Research

Chair of the Russian Quantum Centre

AGREED

Head of Landau Phystech-School of Physics & Research

A. V. Rogachev

Specialty: Applied Quantum Technologies/Прикладные квантовые технологии

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters				Hours								Coursework and test papers	hours in week				TOTAL HOURS	Credit points		
		Examinations		Graded test ("-" - simple)	State Examination	Laboratory classes	of them					Hours for preparation and examinations	Distribution by courses and semesters				Total	Basic		Elective		
		1	2				3	4	Total classroom sessions	Lectures	Laboratory classes		Practical lessons, seminars, exercises, etc.		Practice	Independent study					1 course	
				1 sem. 15 weeks	2 sem. 15 weeks	3 sem. 15 weeks						4 sem. 15 weeks										
		1	2	3	4	1	2	3	4	1	2	3	4		lect.	lab.	sem.	lect.		lab.	sem.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
M.1	Courses (Modules)/Дисциплины (модули)					900	405	240	30	135		495	180	8				1 080	24	9	15	
M.1.1	Foreign Languages/Иностранные языки					180	120			120		60		4				180	4	4		
						90	60			60		30		2	4			90	2	2		
						90	60			60	2	30		2		4		90	2	2		
	Humanitarian and Social Cycle/Гуманитарный и социальный цикл					165	60	60				105	60	4				225	5	5		
M.1.2	Global Trends and Methods for Strategic Development in the Era of Uncertainty/Глобальные тренды и методы стратегического развития в эпоху неопределенности	1				60	30	30				30	30	2	2			90	2	2		
M.1.3	Digital Transformation: Social and Economic Challenges/Цифровая трансформация: социальные и экономические вызовы		2			105	30	30				75	30	2		2		135	3	3		
	Core science/Профильные дисциплины					555	225	180	30	15		330	120					675	15		15	
M.1.B.1	Quantum Information Processing/Обработка квантовой информации	1				105	45	30		15		60	30	2	1			135	3		3	
M.1.B.2	Quantum Communications/Квантовая связь	1				60	30	30				30	30	2				90	2		2	
M.1.B.3	Solid-State Quantum Computing/Твердотельные квантовые вычисления	1				60	30	30				30	30	2				90	2		2	
M.1.B.4	Machine Learning for Quantum and Statistical Physics/Машинное обучение для квантовой и статистической физики				2	90	30	30				60				2		90	2		2	
M.1.B.5	Labs in Quantum Photonics and Cryptography/Лабораторный практикум по квантовой фотонике и криптографии				2	90	30		30			60				2		90	2		2	
M.1.B.6	Introduction to Quantum Metrology/Основы квантовой метрологии				2	90	30	30				60				2		90	2		2	
M.1.B.7	Physics of Quantum Fluids/Физика квантовых жидкостей	2				60	30	30				30	30			2		90	2		2	
M.2	Practice/Практика					4 020					4 020		30					4 050	90	90		
M.2.1	Industrial Practice/Производственная практика					4 020					4 020		30					4 050	90	90		
M.2.1.1	Personal Research Project/Научно-исследовательская работа					4 020					4 020		30					4 050	90	90		
					1	810					810							810	18	18		
					2	810					810							810	18	18		
					3	1 230					1 230		30					1 260	28	28		

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters												Hours											hours in week								Credit points			
		Examinations						Graded test ("-" - simple)						State Examination	Laboratory classes	of them						Hours for preparation and examinations	Coursework and test papers	Distribution by courses and semesters								TOTAL HOURS	Total	Basic	Elective	
		1				2		3		1						2		3		4				1 course				2 course								
		1	2	3	4	1	2	3	4	1	2	3	4			1	2	3	4	1	2			3	4	1	2	3	4	1	2					3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22															
					1 170					1 170								1 170	26	26																
M.3	State Final Certification/Государственная итоговая аттестация				240						240	30						270	6	6																
M.3.1	Performance of and Defence of Graduation Thesis/Выполнение и защита выпускной квалификационной работы				240						240	30						270	6	6																
Ф. 1	Elective Subjects/Факультативы				705	375	150	60	165		330	60						765	17		17															
Ф.1.B.1	Military training/Военная подготовка	1	2		435	225	90	60	75		210	60		3	2	3	2	3	495	11	11															
Ф.1.B.2	Продвинутые методы машинного обучения				270	150	60		90		120							270	6		6															
					135	60	30		30		75			2	2			135	3		3															
					135	90	30		60		45					2	4	135	3		3															
TOTAL:		Number of examinations and pass/fail tests						Distribution of hours by type of lesson						Distribution of classroom hours per week by semester				Total hours	Total number of credits																	
		Examinations			Pass/Fail tests																															
	Fixed (without State Final Examination)	4	2	1	2	5	1	Obl.	5 160	405	240	30	135	4 020	735	240	8	13	14			5 400	120	105	15											
	Extracurriculars	1	1		1	2		ECs.	705	375	150	60	165		330	60		11	14			765	17													
State Final Examination				1																																
																	Distribution of hours of contact work by years and semesters				Total hours															
																	919		59		978															
																	431	488	25	34																
																	Distribution of credits by years and semesters																			
																	60		60																	
																	29	31	28	32																

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Landau Phystech-School of Physics & Research

Chair of Physics and Technology of nanostructures

AGREED

Head of Landau Phystech-School of Physics & Research

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Specialty: Advanced 2D Materials/Перспективные двумерные материалы

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters				Hours								Coursework and test papers	hours in week				TOTAL HOURS	Credit points					
		Examinations		Graded test ("-" - simple)		Laboratory classes	of them					Hours for preparation and examinations	Distribution by courses and semesters				Total	Basic		Elective					
		1	2	3	4		1	2	3	4	Laboratory classes		Total classroom sessions		Lectures	Practical lessons, seminars, exercises, etc.					Practice	Independent study	1 course		2 course
						1 sem. 15 weeks						2 sem. 15 weeks					3 sem. 15 weeks			4 sem. 15 weeks					
		1	2	3	4	1	2	3	4	6	7	8	9		10	11	12	13		14	15	16	17	18	19
M.1	Courses (Modules)/Дисциплины (модули)							1 065	570	360	30	180		495	330	8						1 395	31	9	22
M.1.1	Foreign Languages/Иностранные языки							180	120			120		60	60	4						180	4	4	
							-1	90	60			60		30		2		4				90	2	2	
							2	90	60			60	2	30		2			4			90	2	2	
	Humanitarian and Social Cycle/Гуманитарный и социальный цикл							165	60	60				105	60	4						225	5	5	
M.1.2	Global Trends and Methods for Strategic Development in the Era of Uncertainty/Глобальные тренды и методы стратегического развития в эпоху неопределенности	1						60	30	30				30	30	2	2					90	2	2	
M.1.3	Digital Transformation: Social and Economic Challenges/Цифровая трансформация: социальные и экономические вызовы		2					105	30	30				75	30	2		2				135	3	3	
	Core science/Профильные дисциплины							720	390	300	30	60		330	270							990	22		22
M.1.B.1	Nanomaterials Analysis and Research/Физические методы исследований наноматериалов							105	60	30	30			45	30							135	3		3
							1	45	30	15	15			15		1	1					45	1		1
			2					60	30	15	15			30	30			1	1			90	2		2
M.1.B.2	Basics of Semiconductor Electronics/Основы полупроводниковой электроники	1						60	30	30				30	30	2						90	2		2
M.1.B.3	Laser Physics/Физика лазеров						1	105	60	30		30		45	30							135	3		3
							1	45	30	15		15		15		1	1					45	1		1
			2					60	30	15		15		30	30			1	1			90	2		2
M.1.B.4	Electronic Transport in 2D Materials/Электронный транспорт в двумерных материалах		2					60	30	30				30	30			2				90	2		2
M.1.B.5	Semiconductor Nanoelectronic Devices/Полупроводниковые нанoelectronic устройства		2					60	30	30				30	30			2				90	2		2
M.1.B.6	Methods for the Synthesis of Nanomaterials/Методы синтеза наноматериалов				3			60	30	30				30	30					2		90	2		2
M.1.B.7	Open Quantum Systems/Открытые квантовые системы				3			105	60	30		30		45	30					2	2	135	3		3
M.1.B.8	First Principles Simulations and Modeling/Первопринципные методы расчета свойств материалов				3			60	30	30				30	30					2		90	2		2
M.1.B.9	Fundamentals of Optical Radiation Propagation and Scattering/Основы распространения и рассеяния оптического излучения							105	60	60				45	30							135	3		3

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters												Hours											hours in week								Credit points		
		Examinations						Graded test ("-" - simple)						State Examination	Laboratory classes	of them						Hours for preparation and examinations	Coursework and test papers	Distribution by courses and semesters								TOTAL HOURS	Total	Basic	Elective
		1				2		3		4		1				2		3		4				1 course				2 course							
		1	2	3	4	1	2	1	2	1	2	1	2			1	2	1	2	1	2			lect.	lab.	sem	lect.	lab.	sem	lect.	lab.				
1	2													5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
										1				45	30	30				15				2					45	1	1				
		2												60	30	30				30	30			2					90	2	2				
M.2	Practice/Практика													3 705					3 705		30							3 735	83	83					
M.2.1	Personal Research Project/Научно-исследовательская работа													3 705					3 705		30							3 735	83	83					
										1				855					855									855	19	19					
														765					765									765	17	17					
														1 005					1 005		30							1 035	23	23					
														1 080					1 080									1 080	24	24					
M.3	State Final Certification/Государственная итоговая аттестация													240							240	30						270	6	6					
M.3.1	Performance of and Defence of Graduation Thesis/Выполнение и защита выпускной квалификационной работы									4				240							240	30						270	6	6					
Ф.1	Elective Subjects/Факультативы													810	405	180	60	165		405	90							900	20	20					
Ф.1.B.1	Military training/Военная подготовка	1	2											435	225	90	60	75		210	60			3	2	2	3	2	3	495	11	11			
Ф.1.B.2	Продвинутые методы машинного обучения													270	150	60		90		120									270	6	6				
														135	60	30		30		75				2		2			135	3	3				
														135	90	30		60		45						2	4		135	3	3				
Ф.1.B.3	Функции Грина и квантово-полевые методы в теории конденсированного состояния													105	30	30				75	30								135	3	3				
														45	15	15				30				1					45	1	1				
														60	15	15				45	30							90	2	2					
TOTAL:		Number of examinations and pass/fail tests						Distribution of hours by type of lesson											Distribution of classroom hours per week by semester								Total hours	Total number of credits							
		Examinations			Pass/Fail tests																														
		2	6	4	5	2	1	Obl.	5 010	570	360	30	180	3 705	735	390	8	14	16	8								5 400	120	98	22				
		1	2		2	2		ECs.	810	405	180	60	165		405	90		12	15									900	20						
						1											Distribution of hours of contact work by years and semesters								Total hours										
		1 017				202												1 219																	
		461	556	168	34																														
		Distribution of credits by years and semesters																																	
		60				60																													
		28	32	30	30																														

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