

ACADEMIC PLAN

Qualification Master

Year of enrollment 2022

Statutory duration of a study course 2 years

APPROVED

Vice Rector for Academic Affairs

A. A. Voronov

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

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)				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	5	6	7	8			9	10	11	12	13	14	1 course						2 course														
																							1 sem. 15 weeks						2 sem. 15 weeks		3 sem. 15 weeks		4 sem. 15 weeks										
		lect.		lab.		sem.		lect.		lab.		sem.		lect.			lab.		sem.		lect.		lab.			sem.																	
1	2	3							4							5	15								16	17				18				19	20			21			22		
M.1	Courses (Modules)/Дисциплины (модули)								4 920	405	240	30	135	4 020	495	210	8									5 130	114	99	15														
M.1.1	Foreign Languages/Иностранные языки								180	120			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					105	60	4									225	5	5														
M.1.2	Populism, Fakes, and Post-Truth: Algorithm-Driven Media Consumption and New Social Phenome/Популизм, фейки и постправда: алгоритмизированное медиапотребление и новые социальные феномены	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								4 575	225	180	30	15	4 020	330	150	2									4 725	105	90	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	Практика								4 020						4 020	30									4 050	90	90																
M.2.1	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																

№ in order	Name of disciplines, practices, State Final Examination	Form of final control by semesters												Hours													hours in week				TOTAL HOURS	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					Laboratory classes	Total classroom sessions	Lectons	Practical lessons, seminars, exercises, etc.	Practice	Independent study			1 course				2 course								
		1	2	3	1	2	3	1	2	3	1	2	3											1	2	3	4	1 sem. 15 weeks	2 sem. 15 weeks	3 sem. 15 weeks						4 sem. 15 weeks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22															
					810					810								810	18	18																
			3		1 230					1 230								1 260	28	28																
					1 170					1 170								1 170	26	26																
M.3	State Final Certification/Государственная итоговая аттестация				240						240							270	6	6																
M.3.1	Performance of and Defence of Graduation Thesis/Выполнение и защита выпускной квалификационной работы				4						4							270	6	6																
Ф.1	Факультативы				465	225	90	60	75		240	30						495	11		11															
Ф.1.B.1	Military training/Военная подготовка	1			465	225	90	60	75		240	30		3	2	3	2	3	495	11		11														
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			ECs.	465	225	90	60	75		240	30		7	8			495	11										
State Final Examination					1																															
														Distribution of hours of contact work by years and semesters								Total hours														
758				59				817																												
367		391		25		34																														
		Distribution of credits by years and semesters																				Total hours														
60				60																																
29		31		28		32																														

Head of Educational Department

I. R. Garayshina

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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
Chair of Physics and Technology of nanostructures

AGREED
Head of Landau Phystech-School of Physics & Research

A. V. Rogachev

Partner organization: Faculty of Science and Technology, University of Twente
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)	State Examination	Laboratory classes	of them						Hours for preparation and examinations	Distribution by courses and semesters				Total	Basic		Elective		
						Total classroom sessions	Lectons	Laboratory classes	Practical lessons, seminars, exercises, etc.	Practice	Independent study		1 course		2 course							
		1	2	3	4							1	2		3	4	5	6		7	8	lect.
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)				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		4				180	4	4		
				-1		90	60			60		30		2		4		90	2	2		
	Humanitarian and Social Cycle/Гуманитарный и социальный цикл			2		90	60			60		30		2		4		90	2	2		
						165	60	60				105	60	4				225	5	5		
M.1.2	Populism, Fakes, and Post-Truth: Algorithm-Driven Media Consumption and New Social Phenome/Популизм, фейки и постправда: алгоритмизированное медиапотребление и новые социальные феномены	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	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					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 нанoeлектронные 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	

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		Examinations			Graded test ("-" - simple)			State Examination	Laboratory classes	of them					Hours for preparation and examinations	Distribution by courses and semesters								TOTAL HOURS	Total	Basic	Elective					
		1	2	3	4	1	2			3	4	Total classroom sessions	Lectons			Laboratory classes	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 sem. 15 weeks	2 sem. 15 weeks	3 sem. 15 weeks	4 sem. 15 weeks	
1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	lect.	lab.	sem	lect.	lab.	sem					lect.	lab.	sem	lect.	lab.
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
					1				45	30	30				15			2											45	1	1	
		2							60	30	30					30			2										90	2	2	
M.2	Practice/Практика								3 705					3 705		30													3 735	83	83	
M.2.1	Industrial Practice/Производственные практики								3 705					3 705		30													3 735	83	83	
M.2.1.1	Personal Research Project/Научно-исследовательская работа								3 705					3 705		30													3 735	83	83	
					1				855					855															855	19	19	
						2			765					765															765	17	17	
			3						1 005					1 005		30													1 035	23	23	
							4		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			4	240						240	30													270	6	6	
Ф.1	Факультативы								465	225	90	60	75		240	30													495	11	11	
Ф.1.B.1	Military training/Военная подготовка	1					-2		465	225	90	60	75		240	30		3	2	2	3	2	3						495	11	11	
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)																						5 400	120 98 22							
		2	6	4		5	2	1	Obl.	5 010	570	360	30	180	3 705	735	390	8	14	16	8											
	Extracurriculars																						495	11								
	1				1			ECs.	465	225	90	60	75		240	30		7	8													
	State Final Examination																						1 017									
				1														Distribution of hours of contact work by years and semesters														
	815				202																											
	378	437		168	34																											
	Distribution of credits by years and semesters																															
	60			60																												
	28	32		30	30																											

Head of Educational Department

I. R. Garayshina