



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 11.04.04 Electronics and Nanoelectronics

Educational Programme "Applied Electronics and Photonics"

Trajectories: "Engineering in Electronics, Micro- and Nanoelectronics", "Quantum Nanoelectronics and Materials",
"Technological Foundations of Quantum Computing and Quantum Communications"

Implementing unit: Tikhonov Moscow Institute of Electronics and Mathematics, HSE - Moscow

Years of Study: 2022/2023 - 2023/2024

Length of Programme: 2 years

Mode of Study: Full Time

Degree: Master's degree / MBA

APPROVED

17.03.2023

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Block Code	Course	Subject type	Credits	Credits by Years		Planned Educational Programme Development Results
				1	2	
	Degree Programme		120,00	60,00	60,00	
	Engineering in Electronics, Micro- and Nanoelectronics (Applied track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	
1	Engineering in Electronics, Micro- and Nanoelectronics (mentor's workshop)	C	9,00	3,00	6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Research and Design Seminar	C	6,00	3,00	3,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		36,00	9,00	27,00	
	Project Internship		6,00	6,00		
1	Project	E	6,00	6,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Professional Internship		12,00	3,00	9,00	

1	Work Experience Internship	C	3,00	3,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Graduation Internship	C	9,00		9,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Research Internship		18,00		18,00	
1	Graduation Thesis	C	18,00		18,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Major		54,00	42,00	12,00	
	Specialization Disciplines		54,00	42,00	12,00	
1	CAD Systems for Micro- and Nanoelectronics Devices	C	6,00		6,00	GPC-2, GPC-3, PC-11, PC-7, PC-8, UC-1, UC-2
2	Measurement and Control of Parameters of Electronic Components and Means	C	6,00		6,00	GPC-1, GPC-2, PC-15, PC-3, PC-4
3	Micro- and Nanoelectronics	C	6,00	6,00		GPC-1, PC-1, PC-2, PC-4, PC-7, UC-1, UC-2, UC-6
4	Analog and Digital Devices	C	12,00	12,00		GPC-2, GPC-3, PC-7, PC-8, UC-4, UC-5, UC-6
5	Fundamentals of conceptual design of innovations	C	6,00	6,00		GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, UC-1, UC-2, UC-3
6	Computer-based Measurement Technologies	C	6,00	6,00		GPC-2, GPC-4, PC-3, PC-4, UC-1, UC-2, UC-3
7	Design and Modeling of the Element Base of Microelectronics	C	6,00	6,00		GPC-1, GPC-2, GPC-3, PC-14, PC-7, PC-8, UC-2, UC-3, UC-4
8	Automated Systems to Ensure Reliability and Quality of Electronic Means	C	6,00	6,00		GPC-3, PC-7, UC-2
	Magolego		9,00	3,00	6,00	
1	All-university Pool MAGOLEGO Courses	E	9,00	3,00	6,00	GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
	Final State Certification (FSC)		6,00		6,00	
1	Final Qualification Paper	C	6,00		6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Technological Foundations of Quantum Computing and Quantum Communications (Applied track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	

1	Research and Design Seminar	C	6,00	3,00	3,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Technological Foundations of Quantum Computing and Quantum Communications (mentor's workshop)	C	9,00	3,00	6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		36,00	9,00	27,00	
	Project Internship		6,00	6,00		
1	Project	E	6,00	6,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Professional Internship		12,00	3,00	9,00	
1	Graduation Internship	C	9,00		9,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Work Experience Internship	C	3,00	3,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Research Internship		18,00		18,00	
1	Graduation Thesis	C	18,00		18,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Major		54,00	42,00	12,00	
	Specialization Disciplines		54,00	42,00	12,00	
1	Technological Foundations of Quantum Computing and Quantum Communications	C	6,00		6,00	GPC-1, GPC-2, PC-1, PC-11, UC-4
2	Special Workshop on the Technological Foundations of Creating Nanostructures	C	6,00		6,00	GPC-1, GPC-2, PC-1, PC-10, PC-9, UC-4, UC-6
3	Analytical and Numerical Modeling	C	6,00	6,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
4	Applied Quantum and Statistical Physics	C	12,00	12,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
5	Solid-state Electronics Materials	C	6,00	6,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
6	Materials and Instruments for Nano- and Optoelectronics	C	6,00	6,00		GPC-3, GPC-4, PC-5, UC-1, UC-3, UC-5

7	Experimental Methods of Photonics	C	6,00	6,00		GPC-3, GPC-4, PC-3, PC-4, PC-5, UC-1, UC-3, UC-5
8	Labs in quantum photonics and cryptography	C	6,00	6,00		GPC-1, GPC-2, PC-1, PC-10, PC-9, UC-4, UC-6
	Magolego		9,00	3,00	6,00	
1	All-university Pool MAGOLEGO Courses	E	9,00	3,00	6,00	GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
	Final State Certification (FSC)		6,00		6,00	
1	Final Qualification Paper	C	6,00		6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Quantum Nanoelectronics and Materials (Applied track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	
1	Quantum nanoelectronics and materials (mentor workshop)	C	9,00	3,00	6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Research and Design Seminar	C	6,00	3,00	3,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		36,00	9,00	27,00	
	Project Internship		6,00	6,00		
1	Project	E	6,00	6,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Professional Internship		12,00	3,00	9,00	
1	Graduation Internship	C	9,00		9,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Work Experience Internship	C	3,00	3,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Research Internship		18,00		18,00	

1	Graduation Thesis	C	18,00		18,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Major		54,00	42,00	12,00	
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2	Special Workshop on the Technological Foundations of Creating Nanostructures	C	6,00		6,00	GPC-1, GPC-3, GPC-4, UC-1, UC-2
3	Analytical and Numerical Modeling	C	6,00	6,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
4	Solid-state Electronics Materials	C	6,00	6,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
5	Labs in quantum photonics and cryptography	C	6,00	6,00		GPC-1, GPC-2, PC-1, PC-10, PC-9, UC-4, UC-6
6	Materials and Instruments for Nano- and Optoelectronics	C	6,00	6,00		GPC-3, GPC-4, PC-3, PC-4, PC-5, UC-1, UC-3, UC-5
7	Applied Quantum and Statistical Physics	C	12,00	12,00		GPC-3, PC-4, PC-5, UC-1, UC-3, UC-6
8	Experimental Methods of Photonics	C	6,00	6,00		GPC-3, GPC-4, PC-3, PC-4, PC-5, UC-1, UC-3, UC-5
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1	All-university Pool MAGOLEGO Courses	E	9,00	3,00	6,00	GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
	Final State Certification (FSC)		6,00		6,00	
1	Final Qualification Paper	C	6,00		6,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, PC-15, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6

Curriculum agreed:

Academic Supervisor	ARUTYUNOV K.Y.	20.02.2023
Dean	KROUK E.A.	20.02.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	02.03.2023

* Subject type:

Compulsory course

C

Elective course

E