



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 09.04.01 Information Science and Computation Technology

Educational Programme "Computer Systems and Networks"

Trajectories: "Computer Networks", "Computing Systems and Complexes", "Digital Twins of Electronics and Computer Products", "Highload Systems and Code Optimization"

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

Years of Study: 2023/2024 - 2024/2025

Length of Programme: 2 years

Mode of Study: Full Time

Degree: Master's degree / MBA

APPROVED

14.06.2023

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	
	Computing Systems and Complexes (Applied track)		120,00	60,00	60,00	
	Key Seminars		18,00	9,00	9,00	
1	Research Seminar	C	6,00	3,00	3,00	PC-4, UC-1, UC-2, UC-6
2	Project Seminar	C	6,00	3,00	3,00	GPC-2.ISC, PC-4, PC-5, UC-1, UC-2, UC-5
3	Mentor's Seminar "Computing Systems and Complexes"	C	6,00	3,00	3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		24,00	6,00	18,00	
	Project Internship		6,00	6,00		
1	Project	E	6,00	6,00		GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, PC-1, PC-11, PC-12, PC-4, PC-5, PC-7, PC-8, UC-1, UC-3, UC-5
	Professional Internship		9,00		9,00	
1	Work Experience Internship	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, PC-1, PC-2, UC-1, UC-2
	Research Internship		9,00		9,00	

1	Graduation Thesis	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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			66,00	45,00	21,00	
1	Introduction to Data Analysis	C	3,00	3,00		GPC-3.ISC, PC-2, PC-4, PC-5, PC-6
2	Distributed Databases and Network Computing	C	12,00	12,00		GPC-3.ISC, PC-2, PC-4, PC-5, PC-6
3	System Analysis and Complex Systems Design	C	3,00	3,00		PC-1, PC-3, PC-5, UC-1, UC-3, UC-6
4	Modern Computer Systems	C	9,00	9,00		GPC-1.ISC, GPC-2.ISC, PC-1, PC-2, UC-1, UC-2
5	Optimizing Compilation Technologies	C	6,00	6,00		PC-10, PC-2, PC-4, PC-7, PC-8, UC-1, UC-3, UC-6
6	Software Engineering	C	6,00	6,00		PC-10, PC-12, PC-3, PC-4, PC-8
7	Computer Simulation	C	6,00	6,00		PC-10, PC-12, UC-2, UC-4
8	The Architecture of the Computing Cores of Modern Microprocessors	C	6,00		6,00	PC-10, PC-2, PC-4, PC-7, PC-8, UC-1, UC-3, UC-6
9	Neural Networks: Tasks and Computation	C	6,00		6,00	PC-4, PC-8
10	Architecture Features Support in the Operating Systems Development	C	6,00		6,00	PC-10
11	IT-Projects and IT-Processes Management	C	3,00		3,00	PC-13, PC-14, PC-3, PC-4, PC-5, UC-5
Magolego			9,00		9,00	
1	All-university Pool MAGOLEGO Courses	E	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC
Final State Certification (FSC)			3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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
Computer Networks (Applied track)			120,00	60,00	60,00	
Key Seminars			18,00	9,00	9,00	
1	Project Seminar	C	6,00	3,00	3,00	GPC-2.ISC, PC-4, PC-5, UC-1, UC-2, UC-5
2	Research Seminar	C	6,00	3,00	3,00	PC-4
3	Mentor's Seminar "Computer Networks"	C	6,00	3,00	3,00	GPC-1.ISC, GPC-3.ISC, GPC-4.ISC, GPC-6.ISC, GPC-7.ISC, UC-1, UC-2, UC-4, UC-5

	Internship		24,00	6,00	18,00	
	Project Internship		6,00	6,00		
1	Project	C	6,00	6,00		GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, PC-1, PC-4, PC-5, PC-7, PC-8, UC-1, UC-3, UC-5
	Professional Internship		9,00		9,00	
1	Work Experience Internship	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, PC-1, PC-2, UC-1, UC-2
	Research Internship		9,00		9,00	
1	Graduation Thesis	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		66,00	45,00	21,00	
1	Software Engineering	C	6,00	6,00		PC-10, PC-12, PC-3, PC-4, PC-8
2	Introduction to Data Analysis	C	3,00	3,00		GPC-3.ISC, PC-2, PC-4, PC-5, PC-6
3	System Analysis and Complex Systems Design	C	3,00	3,00		PC-1, PC-3, PC-5, UC-1, UC-3, UC-6
4	Modern Computer Systems	C	9,00	9,00		GPC-1.ISC, GPC-2.ISC, PC-1, PC-2, UC-1, UC-2
5	Distributed Databases and Network Computing	C	12,00	12,00		GPC-3.ISC, PC-2, PC-4, PC-5, PC-6
6	Computer Systems Architecture and Technology	C	6,00	6,00		GPC-3.ISC, PC-1, PC-13, UC-3
7	Equipment of Computer Network and Telecommunication Systems	C	6,00	6,00		PC-4, PC-9
8	Security of Computer Systems and Computer Networks	C	6,00		6,00	PC-10, PC-12
9	Wireless Networks and Portable Systems	C	6,00		6,00	PC-12
10	Management and Monitoring of Computer Networks	C	6,00		6,00	PC-10
11	IT-Projects and IT-Processes Management	C	3,00		3,00	PC-13, PC-14, PC-3, PC-4, PC-5, UC-5
	Magolego		9,00		9,00	
1	All-university Pool MAGOLEGO Courses	E	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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
	Highload Systems and Code Optimization (Applied track)		120,00	60,00	60,00	

	Key Seminars		15,00	6,00	9,00	
1	Highload systems and code optimization	C	9,00	3,00	6,00	GPC-1.ISC, GPC-3.ISC, PC-1, PC-12, PC-3, PC-9, UC-3, UC-4
2	Project Seminar	C	6,00	3,00	3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, PC-1, PC-12, PC-4, PC-5, PC-7, PC-8, UC-4, UC-6
	Internship		27,00	9,00	18,00	
	Project Internship		8,00	6,00	2,00	
1	Project	C	8,00	6,00	2,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		10,00	3,00	7,00	
1	Work Experience Internship	C	3,00	3,00		GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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	7,00		7,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		9,00		9,00	
1	Graduation Thesis	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		66,00	42,00	24,00	
1	Web applications development	C	6,00	6,00		PC-1, PC-10, PC-11, PC-3, PC-4, PC-5, UC-5
2	Software Engineering	C	6,00	6,00		PC-10, PC-12, PC-3, PC-4, PC-8
3	System Analysis and Complex Systems Design	C	3,00	3,00		PC-1, PC-5, UC-1, UC-3, UC-6

4	Distributed Databases and Network Computing	C	12,00	12,00		GPC-3.ISC, PC-2, PC-4, PC-5, PC-6, UC-1, UC-2, UC-3
5	Advanced C++	C	9,00	9,00		PC-2, PC-4, PC-5, PC-7
6	Programming languages and compilers	C	6,00	6,00		GPC-2.ISC, PC-10, PC-12, PC-4
7	IT Product Management	C	3,00		3,00	GPC-3.ISC, PC-1, PC-2, PC-5, UC-1
8	Operating Systems	C	6,00		6,00	PC-2, PC-4, PC-7
9	Multithreaded Programming	C	6,00		6,00	PC-2, PC-4, PC-7, UC-2, UC-4
10	Advanced Programming in Python	C	6,00		6,00	GPC-2.ISC, GPC-3.ISC, GPC-5.ISC, GPC-6.ISC, GPC-8.ISC, PC-1, PC-11, PC-2, PC-7
11	IT-Projects and IT-Processes Management	C	3,00		3,00	PC-13, PC-14, PC-3, PC-4, PC-5, UC-5
	Magolego		9,00	3,00	6,00	
1	All-university Pool MAGOLEGO Courses	E	9,00	3,00	6,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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
	Digital Twins of Electronics and Computer Products (Applied track)		120,00	60,00	60,00	
	Key Seminars		27,00	9,00	18,00	
1	Mentor's Seminar «Digital Transformation of Highly Reliable Product Design Processes»	C	6,00	3,00	3,00	GPC-1.ISC, UC-1, UC-2, UC-4
2	Research Seminar "Modern Methods of Creating Electronic Layouts and Digital Doubles"	C	9,00	3,00	6,00	GPC-5.ISC, GPC-6.ISC, PC-6, PC-8, UC-2, UC-3
3	Project Seminar "Standardization in the Field of Design of Electronic and Computer Equipment Products"	C	12,00	3,00	9,00	GPC-4.ISC, GPC-8.ISC, PC-10, PC-11, PC-9, UC-5, UC-6
	Internship		24,00	6,00	18,00	
	Project Internship		6,00	6,00		
1	Project	E	6,00	6,00		GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Professional Internship		9,00		9,00	

1	Work Experience Internship	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		9,00		9,00	
1	Graduation Thesis	C	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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		57,00	45,00	12,00	
1	Software Engineering	C	6,00	6,00		PC-10, PC-8
2	Introduction to Data Analysis	C	3,00	3,00		GPC-3.ISC, PC-4
3	System Analysis and Complex Systems Design	C	3,00	3,00		UC-1, UC-3, UC-6
4	Modern Computer Systems	C	9,00	9,00		GPC-1.ISC, GPC-2.ISC, PC-1, PC-7, UC-1, UC-2
5	Distributed Databases and Network Computing	C	12,00	12,00		GPC-3.ISC, PC-1, PC-2, UC-1, UC-2, UC-3
6	Application of Electronic Layouts and Digital Twins	C	6,00	6,00		GPC-2.ISC, GPC-7.ISC, PC-13, PC-14, UC-4, UC-6
7	Evaluation of the correctness of the ECB application based on computer modeling	C	6,00	6,00		GPC-4.ISC, PC-10, UC-4, UC-5
8	Comprehensive Study of Physical Processes in Devices by Means of Computer Modeling	C	3,00		3,00	GPC-4.ISC, PC-12, PC-3, UC-3
9	Fundamentals of Devices Dependability	C	3,00		3,00	GPC-4.ISC, GPC-8.ISC, PC-4, PC-8, UC-3, UC-5
10	Methods and Instruments of Measurement, Test and Control	C	6,00		6,00	GPC-3.ISC, GPC-5.ISC, PC-12, PC-8, UC-1
	Magolego		9,00		9,00	
1	All-university Pool MAGOLEGO Courses	E	9,00		9,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC
	Final State Certification (FSC)		3,00		3,00	

1	Final Qualification Paper	C	3,00	3,00	GPC-1.ISC, GPC-2.ISC, GPC-3.ISC, GPC-4.ISC, GPC-5.ISC, GPC-6.ISC, GPC-7.ISC, GPC-8.ISC, PC-1, PC-10, PC-11, PC-12, PC-13, PC-14, 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
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Curriculum agreed:

Academic Supervisor	VISHNEKOV A.V.	08.06.2023
Dean	KROUK E.A.	08.06.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	09.06.2023

* Subject type:

Compulsory course	C
Elective course	E