



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 01.04.04 Applied Mathematics,  
01.04.02 Applied Mathematics and Informatics

Educational Programme "Systems Analysis and Mathematical Technologies"

Trajectories: "Management Systems and Information Processing in Engineering", "Mathematical Methods and Computer Technologies", "Supercomputer Simulations in Science and Engineering"

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

Years of Study: 2024/2025 - 2025/2026

Length of Programme: 2 years

Mode of Study: Full Time

Degree: Master's degree / MBA

APPROVED

19.04.2024

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Block Code	Course	Subject type	Credits	Credits by Years		Planned Educational Programme Development Results
				1	2	
	Degree Programme		120,00	60,00	60,00	
	Management Systems and Information Processing in Engineering (Applied track)		120,00	60,00	60,00	
	Key Seminars		19,00	10,00	9,00	
1	Control and information processing systems (mentor seminar)	C	19,00	10,00	9,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-2, PC-4, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		29,00	5,00	24,00	
	Project Internship		5,00	5,00		
1	Project	C	5,00	5,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, PC-13, 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		9,00		9,00	
1	Work Experience Internship	C	9,00		9,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, PC-13, 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		15,00		15,00	

1	Graduation Thesis	C	15,00		15,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, PC-13, 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	
	Compulsory Courses		36,00	36,00		
1	High Performance Computing	C	6,00	6,00		GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-6
2	Data Analysis and Machine Learning	C	6,00	6,00		GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6, PC-7
3	Applications of the Theory of Operators and Functional Analysis	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-5
4	Systems Analysis	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-11, PC-4, PC-5
5	Modern Control Theory Methods	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-11, PC-2, PC-4, PC-5
6	Stochastic Methods for Engineering Applications	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6, PC-7
	Elective Courses		18,00	6,00	12,00	
1	Methods and Tools for Big Data Processing	E	6,00		6,00	GPC-2.APM, PC-10, PC-2, PC-6
2	Network Modeling	E	6,00		6,00	GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-6
3	Basics of cybersecurity	E	6,00		6,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-2, PC-4, PC-6
4	Management Information System Design	E	6,00		6,00	GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6
5	Modeling in Hydrodynamics	E	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-2
6	Symmetries, Representations and Complex Analysis	E	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM
7	Filtering and Predicting Data	E	6,00	6,00		GPC-3.APM, PC-1, PC-2, PC-3, PC-6
	Magolego		15,00	3,00	12,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	3,00	12,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, 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
	Mathematical Methods and Computer Technologies (Applied track)		120,00	60,00	60,00	
	Key Seminars		19,00	10,00	9,00	

1	Mathematical methods and computer technology (mentor seminar)	C	19,00	10,00	9,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-2, PC-4, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		29,00	5,00	24,00	
	Project Internship		5,00	5,00		
1	Project	C	5,00	5,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, 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		9,00		9,00	
1	Work Experience Internship	C	9,00		9,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, 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		15,00		15,00	
1	Graduation Thesis	C	15,00		15,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, 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	
	Обязательные дисциплины программы		36,00	36,00		
1	High Performance Computing	C	6,00	6,00		GPC-2.AMI, GPC-3.AMI, PC-1, PC-2, PC-3, PC-6
2	Data Analysis and Machine Learning	C	6,00	6,00		GPC-2.AMI, GPC-3.AMI, PC-1, PC-2, PC-3, PC-4, PC-6
3	Analysis of nonlinear and multiphase processes	C	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-10, PC-4, PC-6, PC-9
4	Computer Molecular Biology and Medicine (offered in a foreign language)	C	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-4, PC-6, PC-9
5	Symmetries, Representations and Complex Analysis	C	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI
6	Modeling in Hydrodynamics	C	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-2
	Elective Courses		18,00	6,00	12,00	
1	Methods of Noncommutative Analysis	E	6,00		6,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-2, PC-3, PC-4, PC-6
2	Multiscale Modeling and Supercomputer Architectures	E	6,00		6,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, PC-10, PC-9
3	Models of Complex Systems	E	6,00		6,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, PC-10, PC-9

4	Basics of cybersecurity	E	6,00		6,00	GPC-2.AMI, GPC-3.AMI, PC-1, PC-2, PC-3, PC-4, PC-6
5	Fundamental Quantum Principles and Phenomena	E	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-9
6	Filtering and Predicting Data	E	6,00	6,00		GPC-3.AMI, PC-1, PC-2, PC-3, PC-6
7	Stochastic Methods for Engineering Applications	E	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-4, PC-6
8	Functional Integrals and Functional Derivatives in Mathematical Modelling	E	6,00	6,00		GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI
	Magolego		15,00	3,00	12,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	3,00	12,00	UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, 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
	Supercomputer Simulations in Science and Engineering (Applied track)		120,00	60,00	60,00	
	Key Seminars		19,00	10,00	9,00	
1	Supercomputer Simulation in Science and Engineering (mentor seminar)	C	19,00	10,00	9,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-4, PC-9, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
	Internship		29,00	5,00	24,00	
	Project Internship		5,00	5,00		
1	Project	C	5,00	5,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, PC-13, 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		9,00		9,00	
1	Work Experience Internship	C	9,00		9,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, 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		15,00		15,00	
1	Graduation Thesis	C	15,00		15,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-10, PC-11, PC-12, PC-13, 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	

	Compulsory Courses		36,00	36,00		
1	High Performance Computing	C	6,00	6,00		GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-6
2	Data Analysis and Machine Learning	C	6,00	6,00		GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6, PC-7
3	Selected Chapters of Quantum Mechanics	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM
4	Machine Learning for a Model Construction	C	3,00	3,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-12, PC-2, PC-4, PC-8
5	Stochastic Methods for Engineering Applications	C	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-4, PC-6
6	Supercomputer workshop	C	6,00	6,00		GPC-2.APM, GPC-3.APM, PC-2, PC-3, PC-6, PC-8
7	Population Models in Genomics (offered in a foreign language)	C	3,00	3,00		GPC-1.APM, GPC-2.APM, PC-1, PC-2, PC-4, PC-8
	Elective Courses		18,00	6,00	12,00	
1	Multiscale Modeling and Supercomputer Architectures	E	6,00		6,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-2, PC-7, PC-9
2	Models of Complex Systems	E	6,00		6,00	GPC-1.APM, GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6
3	Management Information System Design	E	6,00		6,00	GPC-2.APM, GPC-3.APM, PC-1, PC-2, PC-3, PC-4, PC-6
4	Modeling in Hydrodynamics	E	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM
5	Symmetries, Representations and Complex Analysis	E	6,00	6,00		GPC-1.APM, GPC-2.APM, GPC-3.APM
	Magolego		15,00	3,00	12,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	3,00	12,00	GPC-1.APM, GPC-2.APM, GPC-3.APM
	Final State Certification (FSC)		3,00		3,00	
1	Final Qualification Paper	C	3,00		3,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, PC-1, PC-10, PC-11, PC-12, PC-13, 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	SLASTNIKOV S.A.	10.04.2024
Dean	KROUK E.A.	12.04.2024
Head of Centre for Educational Model Design	LEPESHKIN I.A.	18.04.2024

\* Subject type:

Compulsory course

C

Elective course

E