



National Research University Higher School of Economics (HSE)

Curriculum

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

Educational Programme "Systems Analysis and Mathematical
Technologies"

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

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

1 st, 2022/2023 academic year

APPROVED

13.10.2022

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Length of Programme: 2 years

Years of Study: 2022/2023 - 2023/2024

Mode of Study: Full Time

Degree: Master's degree / MBA

Block Code	Course	Subject type	Department	Credits	Total Academic Hours	Contact Hours	Allocation of Contact Hours				Additional Information
							1	2	3	4	
Degree Programme				60,00	2 280		964	1 032	1 092	850	
Mathematical Methods and Computer Technologies (Research track)				60,00	2 280	540	154	208	182	142	
Major				42,00	1 596	466	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	Analysis of nonlinear and multiphase processes	C	Department of Applied Mathematics	6,00	228	80			40	40A	
3	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Computer Molecular Biology and Medicine	C	Department of Applied Mathematics	6,00	228	60	28	32A			Foreign language
5	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			
6	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
7	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
8	Filtering and Predicting Data	E	Department of Applied Mathematics	6,00	228	60	28	32A			
9	Functional Integrals and Functional Derivatives in Mathematical Modelling	C	Department of Applied Mathematics	6,00	228	80			40	40A	
Key Seminars				10,00	380	72	14	16	22	20	

1	Mathematical methods and computer technology (mentor seminar)	C	Department of Applied Mathematics	10,00	380	72	14A	16	22	20A	
	Magolego			3,00	114						
1	Elective Courses	E		3,00	114						
	Internship			5,00	190	2				2	
	Project Internship			5,00	190	2				2	
1	Project	E		5,00	190	2				2A	
	Mathematical Methods and Computer Technologies (Applied track)			60,00	2 280	540	154	208	182	142	
	Major			42,00	1 596	466	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	Analysis of nonlinear and multiphase processes	C	Department of Applied Mathematics	6,00	228	80			40	40A	
3	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Computer Molecular Biology and Medicine	C	Department of Applied Mathematics	6,00	228	60	28	32A			Foreign language
5	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			
6	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
7	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
8	Filtering and Predicting Data	E	Department of Applied Mathematics	6,00	228	60	28	32A			
9	Functional Integrals and Functional Derivatives in Mathematical Modelling	C	Department of Applied Mathematics	6,00	228	80			40	40A	
	Key Seminars			10,00	380	72	14	16	22	20	
1	Mathematical methods and computer technology (mentor seminar)	C	Department of Applied Mathematics	10,00	380	72	14A	16	22	20A	
	Magolego			3,00	114						
1	Elective Courses	E		3,00	114						
	Internship			5,00	190	2				2	
	Project Internship			5,00	190	2				2	
1	Project	E		5,00	190	2				2A	
	Applied Artificial Intelligence Models (Applied track)			60,00	2 280	498		108	312	202	
	Major			42,00	1 596	440		90	288	180	
	Elective Courses			6,00	228	80			40	40	
1	Corpus Linguistics	E	School of Linguistics	6,00	228	64			32	32A	
2	2D image processing	E	Department of Applied Mathematics and Information Science	6,00	228	6		6A			Online Course, Foreign language
3	Stochastic Methods for Engineering Applications	E	Department of Applied Mathematics	6,00	228	80			40	40A	
4	Theory of formal languages for text and communication	E	School of Linguistics	6,00	228	48			24	24A	

	Compulsory Courses			36,00	1 368	360		84	192	84	
1	Introduction to Data Analysis	C	Department of Applied Mathematics	6,00	228	60		28	32A		Online Course
2	Information Retrieval	C	Department of Applied Mathematics	6,00	228	60			32	28A	
3	Machine Learning	C	Department of Applied Mathematics	6,00	228	60		28	32A		
4	Multithreaded programming in C/C++	C	Department of Applied Mathematics	6,00	228	60			32	28A	
5	Neural Networks and Deep Learning	C	Department of Applied Mathematics	6,00	228	60			32	28A	
6	Advanced Programming in C/C++	C	Department of Applied Mathematics	6,00	228	60		28	32A		
	Key Seminars			10,00	380	58		16	22	20	
1	Applied Artificial Intelligence Models	C	Department of Applied Mathematics	10,00	380	58		16A	22	20A	
	Magolego			3,00	114						
1	Elective Courses	E		3,00	114						
	Internship			5,00	190			2	2	2	
	Project Internship			5,00	190			2	2	2	
1	Project	E		5,00	190	6		2A	2A	2A	
	Management Systems and Information Processing in Engineering (Research track)			60,00	2 280	540	154	208	158	116	
	Major			42,00	1 596	466	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
3	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Applications of the Theory of Operators and Functional Analysis	C	Department of Applied Mathematics	6,00	228	60			32	28A	
5	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
6	Systems Analysis	C	Department of Applied Mathematics	6,00	228	60	28	32A			
7	Modern Control Theory Methods	C	Department of Applied Mathematics	6,00	228	50			24	26A	
8	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
9	Filtering and Predicting Data	E	Department of Applied Mathematics	6,00	228	60	28	32A			
	Key Seminars			10,00	380	72	14	16	22	20	
1	Control and information processing systems (mentor seminar)	C	Department of Applied Mathematics	10,00	380	72	14A	16	22	20A	
	Magolego			3,00	114						
1	Elective Courses	E		3,00	114						
	Internship			5,00	190	2				2	
	Project Internship			5,00	190	2				2	

1	Project	E		5,00	190	2				2A	
	Management Systems and Information Processing in Engineering (Applied track)			60,00	2 280	540	154	208	158	116	
	Major			42,00	1 596	466	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
3	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Applications of the Theory of Operators and Functional Analysis	C	Department of Applied Mathematics	6,00	228	60			32	28A	
5	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
6	Systems Analysis	C	Department of Applied Mathematics	6,00	228	60	28	32A			
7	Modern Control Theory Methods	C	Department of Applied Mathematics	6,00	228	50			24	26A	
8	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
9	Filtering and Predicting Data	E	Department of Applied Mathematics	6,00	228	60	28	32A			
	Key Seminars			10,00	380	72	14	16	22	20	
1	Control and information processing systems (mentor seminar)	C	Department of Applied Mathematics	10,00	380	72	14A	16	22	20A	
	Magolego			3,00	114						
1	Elective Courses	E		3,00	114						
	Internship			5,00	190	2				2	
	Project Internship			5,00	190	2				2	
1	Project	E		5,00	190	2				2A	
	Supercomputer Simulations in Science and Engineering (Research track)			60,00	2 280	606	162	236	162	104	
	Major			42,00	1 596	526	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	Introduction to numerical methods of optimization	E	Joint Department of Information and Communication Facilities and Systems with RAS Dorodnitsyn Computing Centre	6,00	228	60	28	32A			
3	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Selected Chapters of Quantum Mechanics	C	Department of Applied Mathematics	6,00	228	60	28	32A			
5	Machine Learning for a Model Construction	C	Department of Applied Mathematics	3,00	114	44				44A	
6	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			

7	Population models in genomics	C	Department of Applied Mathematics	3,00	114	28			28A		Foreign language
8	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
9	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
10	Supercomputer workshop	C	Department of Applied Mathematics	6,00	228	60			28	32A	
Key Seminars				10,00	380	80	22	16	22	20	
1	Supercomputer Simulation in Science and Engineering (mentor seminar)	C	Department of Applied Mathematics	10,00	380	80	22A	16	22	20A	
Magolego				3,00	114						
1	Elective Courses	E		3,00	114						
Internship				5,00	190						
Project Internship				5,00	190						
1	Project	E		5,00	190						
Supercomputer Simulations in Science and Engineering (Applied track)				60,00	2 280	548	162	236	162	106	
Major				42,00	1 596	466	144	156	160	120	
1	Data analysis and machine learning	C	Department of Applied Mathematics	6,00	228	72		32A	40A		Online Course
2	Introduction to numerical methods of optimization	E	Joint Department of Information and Communication Facilities and Systems with RAS Dorodnitsyn Computing Centre	6,00	228	60	28	32A			
3	High-Performance Computing	C	Department of Applied Mathematics	6,00	228	60	28	32A			
4	Selected Chapters of Quantum Mechanics	C	Department of Applied Mathematics	6,00	228	60	28	32A			
5	Machine Learning for a Model Construction	C	Department of Applied Mathematics	3,00	114	44				44A	
6	Modeling in Hydrodynamics	E	Department of Applied Mathematics	6,00	228	60	28	32A			
7	Population models in genomics	C	Department of Applied Mathematics	3,00	114	28			28A		Foreign language
8	Symmetries, Representations and Complex Analysis	E	Department of Applied Mathematics	6,00	228	60	28	32A			
9	Stochastic Methods for Engineering Applications	C	Department of Applied Mathematics	6,00	228	80			40	40A	
10	Supercomputer workshop	C	Department of Applied Mathematics	6,00	228	60			28	32A	
Key Seminars				10,00	380	80	22	16	22	20	
1	Supercomputer Simulation in Science and Engineering (mentor seminar)	C	Department of Applied Mathematics	10,00	380	80	22A	16	22	20A	
Magolego				3,00	114						
1	Elective Courses	E		3,00	114						

	Internship			5,00	190	2				2	
	Project Internship			5,00	190	2				2	
1	Project	E		5,00	190	2				2A	

Curriculum agreed:

Academic Supervisor	SLASTNIKOV S.A.	13.10.2022
Dean	KROUK E.A.	13.10.2022
Head of Degree Programmes Development Office	MAMONOVA M.A.	13.10.2022

* Subject type:

Compulsory course

C

Elective course

E