



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 01.04.02 Applied Mathematics and Informatics
Educational Programme "Data Science for Construction, Architecture and Engineering"
Trajectories: "Data Science for Construction, Architecture and Engineering"
Implementing unit: Faculty of Computer Science, HSE - Moscow

APPROVED
07.04.2025
Vice Rector
ROSHCHIN S.Y.
Signed with EDS

Years of Study: 2025/2026 - 2026/2027

Length of Programme: 2 years

Mode of Study: Full Time

Degree: Master's degree / MBA

Block Code	Course	Subject type	Credits	Credits by Years		Planned Educational Programme Development Results
				1	2	
	Degree Programme		120,00	60,00	60,00	
	Data Science for Construction, Architecture and Engineering (General track)		120,00	60,00	60,00	
	Key Seminars		15,00	6,00	9,00	
1	Mentor's Seminar "Data Science for Construction, Architecture and Engineering"	C	15,00	6,00	9,00	GPC-3.AMI, PC-1, UC-2, UC-3
	Internship		24,00	3,00	21,00	
	Preparation of the Graduate Thesis		21,00		21,00	
1	Graduation Thesis	C	21,00		21,00	GPC-1.AMI, GPC-2.AMI, GPC-3.AMI, GPC-4.AMI, 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
	Fixed		3,00	3,00		
1	Course Project	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-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		63,00	45,00	18,00	
	Basic Components		51,00	36,00	15,00	
1	Introduction to Urban Studies and Urban Planning	C	6,00	6,00		GPC-4.AMI, PC-13, PC-14, UC-2
2	Machine Learning	C	6,00	6,00		GPC-3.AMI, PC-7, UC-3

3	Data Analysis Tools	C	6,00	6,00		GPC-2.AMI, PC-2, PC-4, PC-7, PC-8, UC-2
4	Deep Learning	C	6,00	6,00		GPC-2.AMI, PC-4, PC-6, PC-7, UC-1
5	Development Cycle and Real Estate Construction	C	6,00	6,00		GPC-4.AMI, PC-12, PC-14, PC-5, UC-2
6	Modern Database Architecture	C	3,00	3,00		GPC-4.AMI, PC-10, PC-2, UC-2
7	Analysis Spatial Data	C	3,00		3,00	GPC-2.AMI, PC-10, PC-4, UC-2
8	Generative Models	C	3,00		3,00	GPC-2.AMI, PC-2, PC-3, PC-8, UC-2
9	Time Series Modeling and Anomaly Search	C	3,00		3,00	GPC-2.AMI, PC-11, PC-7, UC-2
10	Numerical Optimization in Logistics Problems	C	3,00		3,00	GPC-1.AMI, PC-1, UC-1
11	Operation of Machine Learning Models	C	3,00		3,00	GPC-2.AMI, PC-3, PC-6, PC-7, PC-8, UC-1
12	Distributed Data Processing Systems	C	3,00	3,00		GPC-2.AMI, GPC-3.AMI, PC-1, PC-5, PC-7, UC-1
Elective Courses. 1 year			9,00	9,00		
1	Mathematics for Data Analysis (Linear Algebra)	E	3,00	3,00		GPC-1.AMI, PC-1, UC-1
2	Mathematics for Data Analysis (Mathematical Statistics)	E	3,00	3,00		GPC-1.AMI, PC-1, UC-1
3	Mathematics for Data Analysis (Probability Theory)	E	3,00	3,00		GPC-1.AMI, PC-1, UC-1
4	Project Management	E	6,00	6,00		GPC-4.AMI, PC-12, UC-2
5	Legal Regulation in Urban Planning and Management	E	3,00	3,00		GPC-4.AMI, PC-12, UC-1, UC-5
6	Algorithms and Data Structures for Interviews	E	3,00	3,00		GPC-4.AMI, PC-4, PC-7, PC-8, UC-2
Elective Courses. 2 year			3,00		3,00	
1	Deep Learning for Natural Language Processing	E	3,00		3,00	GPC-3.AMI, PC-3, PC-4, PC-6, PC-8, UC-1, UC-2
2	Computer Vision	E	3,00		3,00	GPC-2.AMI, PC-3, PC-4, PC-6, UC-2
Magolego			15,00	6,00	9,00	
1	All-university Pool MAGOLEGO Courses	E	15,00	6,00	9,00	GPC-4.AMI, PC-1, 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-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

Curriculum agreed:

Academic Supervisor

Горденко М.К.

22.03.2025

Dean

ARZHANTSEV I.V.

28.03.2025

Образовательная программа направлена на формирование и развитие следующих компетенций (результатов освоения):

Competence code	Name of the competence
UC-1	Способен осуществлять критический анализ проблемных ситуаций на основе системного подхода, вырабатывать стратегию действий.
UC-2	Способен управлять проектом на всех этапах его жизненного цикла.
UC-3	Способен организовывать и руководить работой команды, вырабатывать командную стратегию для достижения поставленной цели.
UC-4	Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах), для академического и профессионального взаимодействия.
UC-5	Способен анализировать и учитывать разнообразие культур в процессе межкультурного взаимодействия.
UC-6	Способен определять и реализовывать приоритеты собственной деятельности и способы ее совершенствования на основе самооценки и образования в течении всей жизни.
GPC-1	Способен решать актуальные задачи фундаментальной и прикладной математики.
GPC-2	Способен совершенствовать и реализовывать новые математические методы решения прикладных задач.
GPC-3	Способен разрабатывать математические модели и проводить их анализ при решении задач в области профессиональной деятельности.
GPC-4	Способен комбинировать и адаптировать существующие информационнокоммуникационные технологии для решения задач в области профессиональной деятельности с учетом требований информационной безопасности.
PC-1	Able to find relevant areas of scientific research, set up and test scientific hypotheses
PC-2	Able to write efficient, flexible and readable code to solve practical problems
PC-3	Able to analyze product tasks and propose solutions based on data
PC-4	Able to build and automate pipelines for receiving, preprocessing and analyzing data
PC-5	Able to build hypotheses in the field of development and verify them based on data

PC-6	Able to choose according to the task being solved and build machine learning models, as well as evaluate their quality
PC-7	Able to automate the application of machine learning models
PC-8	Able to work with data of various nature, including poorly structured ones
PC-9	Able to reasonably choose approaches to solving a wide range of infrastructure tasks, ranging from code optimizations taking into account the specifics of the hardware used and ending with the construction of corporate IT systems
PC-10	Able to understand the architecture of large projects and implement new functionality in them
PC-11	Able to formulate mathematical statements of problems in the field of development and choose solutions for them
PC-12	Able to make managerial decisions based on the results of data analysis in the field of urban planning
PC-13	Understands methods and tools of urban development management, directions of urban planning policy and urban planning technologies
PC-14	Understands the specifics of the team's work in the context of urban planning relations

* Subject type:

Compulsory course

C

Elective course

E