



National Research University Higher School of Economics (HSE)

Basic Curriculum

Field of study 06.03.01 Biology

Educational Programme "Cellular and Molecular Biotechnologies"

Implementing unit: Faculty of Biology and Biotechnology, HSE - Moscow

Years of Study: 2022/2023 - 2025/2026

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED

18.05.2022

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Block Code	Course	Subject type	Credits	Credits by Years				Planned Educational Programme Development Results
				1	2	3	4	
	Degree Programme		240,00	60,00	60,00	60,00	60,00	
	Major		159,00	48,00	33,00	40,00	38,00	
	Core Professional Block (Major)		67,00	43,00	20,00	4,00		
	Basic Components		67,00	43,00	20,00	4,00		
1	Probability Theory and Mathematical Statistics	C	4,00		4,00			GPC-1, PC-1, UC-1
2	Histology	C	4,00		4,00			GPC-1, PC-1, UC-1, UC-2
3	Human Physiology with the Basics of Biophysics	C	7,00		7,00			GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-5, PC-6, UC-1
4	Biochemistry	C	5,00		5,00			GPC-1, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-8, PC-9, UC-1
5	Immunology	C	4,00			4,00		GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
6	Linear Algebra	C	6,00	6,00				GPC-6, PC-1, UC-1
7	Calculus	C	5,00	5,00				GPC-6, PC-1, UC-1
8	Elements of Discrete Mathematics	C	4,00	4,00				GPC-6, GPC-7, PC-1, PC-3, PC-9, UC-1, UC-2
9	Structural and Evolutionary Botany	C	4,00	4,00				GPC-1, PC-1, UC-1
10	Invertebrate Zoology	C	5,00	5,00				GPC-1, PC-1, UC-1
11	Vertebrate Zoology	C	5,00	5,00				GPC-1, PC-1, UC-1
12	Physics	C	4,00	4,00				GPC-1, GPC-2, PC-1, PC-2, UC-1
13	General and Inorganic Chemistry	C	5,00	5,00				GPC-2, GPC-6, PC-8, UC-1
14	Organic Chemistry	C	5,00	5,00				GPC-2, GPC-6, PC-8, UC-1, UC-2
	Elective Professional Block (Major)		92,00	5,00	13,00	36,00	38,00	
	Elective disciplines, 4th year		15,00				15,00	

1	Design, Control and Management of Biotechnological Productions	E	5,00				5,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-3, PC-5, PC-8, UC-1, UC-3, UC-5
2	Matrix Processes in Biology	E	5,00				5,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-6, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
3	Molecular Oncology	E	5,00				5,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
4	Startups in Biotechnology and the Search for Financing	E	5,00				5,00	GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, PC-5, UC-1, UC-10, UC-2, UC-3, UC-4
	Research seminar		4,00				4,00	
1	Scientific Research Seminar "Artificial Neural Networks and Machine learning"	C	4,00				4,00	GPC-1, GPC-2, GPC-3, PC-1, PC-3, PC-5, UC-1, UC-2, UC-3, UC-5
	Basic Profile Part		61,00	5,00	13,00		32,00	11,00
1	Genetics (offered in a foreign language)	C	4,00		4,00			GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, UC-1, UC-2, UC-8
2	Microbiology	C	5,00		5,00			GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, UC-1
3	Molecular Biology	C	4,00		4,00			GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-4, PC-5, PC-6, PC-8, PC-9, UC-1, UC-8
4	Genetic Engineering and Bioengineering	C	4,00				4,00	GPC-1, GPC-3, GPC-5, PC-1, PC-2, PC-4, PC-6, PC-8, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6, UC-7
5	Cell signalling (offered in a foreign language)	C	4,00				4,00	GPC-1, GPC-3, GPC-5, GPC-7, PC-1, PC-3, PC-5, PC-7, PC-9, UC-1, UC-2, UC-3
6	Biotechnology Market in Russia	C	3,00				3,00	GPC-1, GPC-3, GPC-5, GPC-7, PC-1, PC-2, PC-5, PC-6, UC-1, UC-2, UC-3, UC-4, UC-5
7	Biotechnology	C	5,00				5,00	GPC-1, GPC-5, PC-1, PC-2, PC-5, PC-6, UC-1, UC-2
8	Bioenergy (offered in a foreign language)	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, UC-1, UC-2
9	Virology	C	3,00				3,00	GPC-1, GPC-2, PC-1, PC-2, PC-9, UC-1, UC-2
10	Differential Equations	C	3,00				3,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, PC-4, UC-1, UC-2, UC-3, UC-4, UC-8

11	Research Methods of Biological Macromolecules	C	6,00			6,00		GPC-1, GPC-2, PC-1, PC-4, UC-1, UC-2
12	Neurobiology of Behavior	C	3,00			3,00		GPC-1, GPC-2, PC-3, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2
13	Theories of Evolution	C	3,00			3,00		GPC-3, PC-1, PC-3, PC-7, PC-8, UC-1, UC-3
14	Ecology	C	3,00			3,00		GPC-1, GPC-4, GPC-7, GPC-8, PC-1, PC-2, PC-7, UC-1, UC-10, UC-11, UC-8, UC-9
15	Embryology	C	3,00			3,00		GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-8
16	Cell Biology: the Basics of Bioprocesses	C	5,00	5,00				GPC-1, GPC-2, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, UC-1, UC-11, UC-2, UC-6
Elective disciplines, 4th year			5,00				5,00	
1	Introduction to Medical Biotechnologies	E	5,00				5,00	GPC-1, GPC-2, PC-1, PC-3, PC-5, UC-1, UC-2, UC-3
2	Non-coding RNAs and Epigenetics	E	5,00				5,00	GPC-1, GPC-3, GPC-5, GPC-7, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, UC-1, UC-3
Elective disciplines, 4th year			7,00				7,00	
1	Production processes in biotechnology	E	7,00				7,00	GPC-1, GPC-3, GPC-5, PC-1, PC-3, PC-5, UC-1, UC-2, UC-3, UC-4, UC-5, UC-6
2	Bioinformatics for Next Generation Sequencing	E	7,00				7,00	GPC-1, GPC-3, GPC-5, PC-1, PC-3, UC-1, UC-2, UC-3, UC-4
Internship			33,00	7,00	6,00	6,00	14,00	
Professional Internship			19,00	7,00	6,00	3,00	3,00	
1	Educational Internship 2	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-3, UC-5, UC-7
2	Science and Research Internship	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, UC-1, UC-2, UC-3, UC-4, UC-5
3	Educational Internship	C	13,00	7,00	6,00			GPC-1, GPC-2, PC-1, PC-2, PC-3, UC-1, UC-2
Project Internship			3,00				3,00	
1	Research or Applied Project	C	3,00				3,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, UC-1, UC-2
Research Internship			11,00				11,00	

1	Preparation of Graduation Thesis	C	3,00				3,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2, UC-3
2	Graduation Internship	C	8,00				8,00	GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, GPC-6, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-2
	General Courses		14,00	5,00	1,00	4,00	4,00	
	Core General Courses		2,00	1,00	1,00			
1	Safe Living Basics	C	1,00	1,00				GPC-1, PC-1, UC-1
2	Physical Training	C	1,00		1,00			GPC-1, PC-1, UC-7
	Optional General Courses		12,00	4,00		4,00	4,00	
1	Legal Literacy	C	4,00				4,00	GPC-1, GPC-2, GPC-3, PC-1, PC-2, PC-3, PC-4, UC-1, UC-3
2	Philosophy	E	4,00			4,00		GPC-1, GPC-2, GPC-3, GPC-5, PC-1, PC-3, PC-5, PC-7, UC-1, UC-2, UC-3, UC-5
3	Economics	C	4,00	4,00				GPC-7, GPC-8, PC-1, PC-6, UC-9
	Minor		20,00		10,00	10,00		
1	Minor	E	20,00		10,00	10,00		GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
	English		1,00				1,00	
	Examinations		1,00				1,00	
1	Independent English Exam (offered in a foreign language)	C						GPC-1, PC-1, UC-1, UC-2, UC-3, UC-4
2	Project Proposal	C	1,00				1,00	GPC-1, PC-1, UC-1, UC-4
3	English Language Integrative Exam (offered in a foreign language)	C						GPC-1, PC-1, UC-1, UC-4
	Optional Courses							
1	Academic writing (offered in a foreign language)	O	2,00				2,00	GPC-1, PC-1, UC-1, UC-2
2	English Language (offered in a foreign language)	O	14,00	8,00	6,00			GPC-1, PC-1, UC-4
	Data Culture		10,00		10,00			
1	Bioinformatics	C	6,00		6,00			GPC-1, GPC-3, GPC-5, GPC-7, GPC-8, PC-1, PC-3, PC-4, PC-8, UC-1, UC-11, UC-2, UC-3, UC-6, UC-9
2	Data Scientist with Python	C	3,00		3,00			GPC-1, GPC-7, GPC-8, PC-1, PC-2, PC-3, PC-8, UC-11
3	Independent Data Science Test. Intermediate	C	1,00		1,00			GPC-6, GPC-7, GPC-8, PC-1, UC-1
4	Independent Programming Test. Intermediate	C						GPC-6, GPC-7, GPC-8, PC-1, UC-1
5	External Examinations on Digital Skills. Entry-level	C						GPC-7
6	External Examinations on Digital Skills. Intermediate Level	C						GPC-7
7	External Examinations on Digital Skills. Final Level	C						GPC-7
8	Independent Digital Literacy Test	C						GPC-1, GPC-6, GPC-7, GPC-8, PC-1, UC-1
	Final State Certification (FSC)		3,00				3,00	

