



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: 2023/2024 - 2026/2027

Length of Programme: 4 years

Mode of Study: Full Time

Degree: Bachelor's degree

APPROVED

12.07.2023

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Block Code	Course	Subject type	Credits	Credits by Years				Planned Educational Programme Development Results
				1	2	3	4	
	Degree Programme		240,00	60,00	60,00	60,00	60,00	
	Major		154,00	47,00	30,00	39,00	38,00	
	Core Professional Block (Major)		62,00	40,00	17,00	5,00		
	Basic Components		62,00	40,00	17,00	5,00		
1	Immunology	C	5,00			5,00		GPC-1, GPC-2, PC-1, PC-2, UC-1, UC-2
2	Invertebrate Zoology	C	5,00	5,00				GPC-1, PC-1, UC-1
3	Vertebrate Zoology	C	5,00	5,00				GPC-1, PC-1, UC-1
4	Linear Algebra	C	4,00	4,00				GPC-6, PC-1, UC-1
5	Mathematical Analysis with the Basics of Differential Equations	C	7,00	7,00				GPC-6, PC-1, UC-1
6	General and Inorganic Chemistry	C	6,00	6,00				GPC-2, GPC-6, PC-8, UC-1
7	Organic Chemistry	C	5,00	5,00				GPC-2, GPC-6, PC-8, UC-1, UC-2
8	Structural and Evolutionary Botany	C	4,00	4,00				GPC-1, PC-1, UC-1
9	Physics	C	4,00	4,00				GPC-1, GPC-2, PC-1, PC-2, UC-1
10	Probability Theory and Mathematical Statistics	C	4,00		4,00			GPC-1, PC-1, UC-1
11	Histology	C	3,00		3,00			GPC-1, PC-1, UC-1, UC-2
12	Human Physiology with the Basics of Biophysics	C	5,00		5,00			GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-5, PC-6, UC-1
13	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
	Elective Professional Block (Major)		92,00	7,00	13,00	34,00	38,00	
	Research seminar		3,00			3,00		
1	Project Seminar	C	3,00			3,00		GPC-1, GPC-2, GPC-8, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8, PC-9, UC-1, UC-11

	Basic Profile Part		62,00	7,00	13,00	31,00	11,00	
1	Differential Equations	C	3,00			3,00		UC-1, UC-2, UC-3, UC-4, UC-8
2	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
3	Theories of Evolution	C	3,00			3,00		GPC-3, PC-1, PC-3, PC-7, PC-8, UC-1, UC-3
4	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
5	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
6	Cell signalling	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
7	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
8	Research Methods of Biological Macromolecules	C	5,00				5,00	GPC-1, GPC-2, PC-1, PC-4, UC-1, UC-2
9	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
10	Virology	C	3,00				3,00	GPC-1, GPC-2, PC-1, PC-2, PC-9, UC-1, UC-2
11	Bioenergy	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
12	Biotechnology	C	5,00				5,00	GPC-1, GPC-5, PC-1, PC-2, PC-5, PC-6, UC-1, UC-2
13	Cell Biology: the Basics of Bioprocesses	C	7,00	7,00				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
14	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, PC-4, PC-6, UC-1, UC-2, UC-8
15	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
16	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
	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
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
Internship			34,00	7,00	6,00	6,00	15,00	
Professional Internship			20,00	7,00	6,00	3,00	4,00	
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	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, 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	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

2	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
	General Courses		18,00	6,00	5,00	4,00	3,00	
	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		16,00	5,00	4,00	4,00	3,00	
1	Philosophy	C	4,00			4,00		GPC-1, GPC-2, GPC-3, GPC-4, PC-1, PC-2, PC-3, PC-4, UC-1, UC-2, UC-3, UC-4
2	Legal Literacy	C	3,00				3,00	GPC-1, GPC-7, GPC-8, PC-1, PC-7, UC-1, UC-10, UC-11, UC-2, UC-3, UC-4, UC-5, UC-6, UC-8, UC-9
3	Economics	C	3,00	3,00				GPC-2, UC-1, UC-10, UC-4, UC-6, UC-9
4	Foundations of Russian Statehood	C	2,00	2,00				GPC-7, PC-9, UC-1, UC-10, UC-2, UC-3, UC-4, UC-5, UC-6
5	Russian History	C	4,00		4,00			UC-1, UC-5
	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	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 English Writing	O	2,00				2,00	GPC-1, PC-1, UC-1, UC-4
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		9,00	1,00		
1	Independent Digital Literacy Test	C						GPC-1, GPC-6, GPC-7, GPC-8, PC-1, UC-1
2	External Examinations on Digital Skills. Entry-level	C						GPC-1, GPC-2, GPC-3, GPC-4, GPC-5, PC-1, PC-2, PC-3, PC-4, UC-1, UC-2, UC-3
3	External Examinations on Digital Skills. Intermediate Level	C						GPC-1, GPC-2, GPC-4, PC-1, PC-2, PC-4, UC-1, UC-3
4	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
5	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
6	Independent Programming Test. Intermediate	C						GPC-6, GPC-7, GPC-8, PC-1, UC-1

7	Data Science, AI and Generative Models Independent Test. Intermediate	C	1,00			1,00		GPC-6, GPC-7, GPC-8, PC-1, UC-1, UC-9
8	External Examinations on Digital Skills. Final Level	C						GPC-1, GPC-3, GPC-5, PC-1, PC-3, PC-5, UC-1, UC-3, UC-5
	Final State Certification (FSC)		3,00				3,00	
	Thesis Work		3,00				3,00	
1	Presenting 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-10, UC-11, UC-2, UC-3, UC-4, UC-5, UC-6, UC-7, UC-8, UC-9
	State Examinations							

**Curriculum agreed:**

Academic Supervisor	Степанова Е.В.	11.07.2023
Dean	TONEVITSKIY A.G.	11.07.2023
Head of Centre for Educational Model Design	LEPESHKIN I.A.	11.07.2023

\* Subject type:

Compulsory course	C
Elective course	E
Optional course	O